ARMY NAVY JOURNAL.

GAZETTE OF THE REGULAR AND VOLUNTEER FORCES.

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THE MILITARY SITUATION.

THERE is not now the shadow of a doubt that Fort Sumter lies a heap of ruins. The entire course of the combined land and naval operations towards this end, from the time of the landing on Morris Island, six weeks ago, now stands forth a very complete and perfect piece of work, and presents the triple result of opening a new epoch in siege operations, seriously crippling the Rebellion in its material parts by closing for ever the leading inlet for blockade-runners, and throwing into the scales of the Union the weight of a moral prestige which will be profoundly felt both at home and abroad. It is true, Charleston is not yet taken, and we cannot share the popular illusions as to the immediate certainty of this achievement. The work still before the Army and Navy is immense. But enough has already been done to "shut up in measureless content" all who have at heart the speedy triumph of the cause of the Union.

General GILLMORE effected the landing of his forces on Morris Island, under cover of the Navy, on the 10th of July, and forthwith began that slow, difficult engineering labor of opening parallels, erecting batteries, etc., which, while it prepares the grandest results, is apt to pass unheeded by the public. In the meanwhile, the fleet of iron-clads and wooden gunboats had been assiduously engaged in firing at the enemy's works on Morris Island and at Fort Sumter, for the purpose of engaging their attention while the preliminary operations of the siege went on. When guns enough had been mounted, General GILLMORE began his operations on Fort Wagner, and after a vigorous shelling by his batteries and the fleet, an assault was made on that work, with a view of carrying it. The attack miscarried. General GILLMORE then proceeded with his siege operations, resolving to leave Fort Wagner aside and concentrate his efforts on Fort Sumter, regarding that as the key to the whole situation, and confident that the reduction of the great sentinel-fort being accomplished, the minor works on Morris Island would fall by their own weight.

Monday the 17th inst., found the preliminary preparations complete, and the bombardment was begun at daybreak of that date. General GILLMORE opened all his batteries on Fort Sumter, firing over Fort Wagner and the intermediate space. The ordnance used consisted of two-hunded-pounder, one hundred pounder and eighty-pounder Parrot rifles, and eighty-pounder Whitworth guns rifled. At the same time, Admiral DAHLGREN moved up the entire available naval force, leading with the flag in the Monitor *Weehawken*, followed by the Monitors *Catskill*, *Nahant*, and *Montauk*—the *Passaic* and *Patapsco* in reserve—for Sumter. The *Ironsides* was placed opposite Fort Wagner, and the gunboats *Canandaigua*, *Mahaska*, *Cimmarone*, *Ottawa*, *Dai-Ching* and *Ladona* at long range. After a steady and well-directed fire, Fort Wagner was silenced shortly after nine o'clock. The only casualty was the killing of the gallant Fleet Captain, G. W. RODGERS, who had taken command of his old vessel, the *Catskill*, for the attack.

Meanwhile the fire of the shore batteries was working effectually upon the gorge of Fort Sumter, which appeared to have been strengthened in every possible manner. The Monitors *Passaic* and *Patapsco* now steamed up and devoted themselves for the rest of the forenoon to the attack of Fort Sumter, taking position at two thousand yards from the fort. The siege batteries continued the bombardment during the whole of the day. Fort Sumter scarcely replied. Of the result of Monday's work we have no precise information. Newspaper accounts, however, state that several craters "five or six feet in depth" could be observed in the south-west face. The sand traverse or barricade which the enemy had thrown up to protect the gorge about the sallyport was, at an early hour, penetrated by shell, which knocked out some of the lower tiers, and brought the pile tumbling down about the wharf in an irregular mass, but still in such a position as to protect the wall in a great degree.

On Tuesday, the 18th, at four o'clock in the morning, the bombardment was renewed. Additional guns had been placed in position during the night. In consequence of a severe gale and high sea, however, the Navy was unable effectually to coöperate in the attack. As before, Fort Sumter was all but silent, batteries Wagner and Gregg being the only assailants on the rebel side. As night closed in the effect of the firing was observable in "deep holes" in the south-west face, and only a portion of the parapet remained; the coping was torn off, and one corner knocked away completely.

The third day of the bombardment—Wednesday, the 19th—witnessed a "continuation of the same," though the firing is said not to have been as rapid as on the two previous days. The gunners, however, had got the range perfectly, and no ammunition was wasted. In the afternoon two of the Monitors advanced towards Fort Sumter for the purpose of attacking it at two thousand yards range, but the current was so strong that the vessels became unmanageable, and the officers were compelled to abandon the design. Fort Sumter fired but one gun during the day, and the new rebel batteries on James Island were the only ones really alive. The firing was kept up regularly throughout the night. "Shots," say the accounts, "were now going through one side of Fort Sumter and passing out of the opposite side; we could see the channel through the apertures made." The siege batteries fired 130 rounds, 75 of which struck Fort Sumter. In the afternoon one of the eighty-pounders was disabled in the breech, the result of its own discharge.

It was now resolved to remove the Whitworth guns and replace them by Parrott rifles. At night a sap was constructed from the third parallel to within two hundred yards of Fort Wagner. The rebels were also building a sap from Fort Wagner towards our works. A dispatch from Charleston to the Richmond papers under date of the 20th inst., says:—"Up to Monday night, the third day of the attack, 1,972 projectiles had struck Fort Sumter, and, including to-day, 2,500 have struck. The damage is, of course, considerable; and for the last two days all the guns on the south face of the Fort have been disabled.

Thursday, the 20th, opened on the fourth day of the siege. The firing was still exceedingly heavy, though the Monitors did not even advance towards the rebel works. At about noon Fort Wagner opened heavily on the land batteries, but ceased after the *Ironsides* got fairly to work. In the morning the rebels commenced shelling the marsh battery from their works on James Island. During the day they fired 116 shots, with but trifling results. Our sappers were still approaching Fort Wagner. On the fifth day of the bombardment, Friday the 21st, says the Richmond *Sentinel*, "the fire of the enemy's land batteries has been kept up on Fort Sumter, and more guns are disabled." A heavy fire was also kept up on battery Wagner, both from the fleet and the land, and also upon battery Gregg. On Saturday the 22d, the land batteries opened on Fort Sumter from south to north, and the Monitors, coming within closer range, from east to west. The rebel papers report *six hundred and four shots fired that day at Fort Sumter, of which four hundred and nineteen struck inside and outside!*

As the results of this extraordinary week's bombardment—a siege unparelelled in military annals, it is announced that "Sumter is an immense ruin!" The surrender, however, had not taken place. "Colonel Rhett," says a Charleston dispatch, "is ordered with his brave garrison to hold his outpost, even as a forlorn hope, until he is relieved or the place taken." On Sunday, 23d, at eleven o'clock, General GILLMORE sent a communication giving notice that at eleven o'clock on Monday, the 24th, he would open fire on Charleston, and "in the meantime non-combatants would go out of the city." The loss of life on the rebel side, during the week's firing, appears to have been quite severe. The real work of the Navy still remains to be done—to pass beyond Fort Sumter into Rebellion Roads and reduce the batteries that line both sides of the water approach to the city. It is doubtless a task that will test to the full the powers of our iron fleet; but the public has implicit confidence that Admiral DAHLGREN and his gallant force will do all that can possibly be done. The only hope for the rebels now is that their interior batteries are still sufficiently formidable to repel our fleet; or that BEAUREGARD make his long promised attack "with the bayonet" on our land force on Morris Island. The denouement of this wonderful drama will of course be watched with the greatest interest.

THE situation of the Army of the Cumberland is of a nature to attract the liveliest attention of all who have any adequate appreciation of the supreme strategic importance of the objective point towards which the operations of General ROSECRANS are directed. The great mountain system which runs like a wedge into the heart of the Confederacy has been aptly styled "the citadel of a large fortress, of which the walls are formed by the parallel ridges, the ditches by the rapid streams in the valley, and the doors by the gaps." Chattanooga is a natural bastion on the salient angle of the great line of rebel communications. The possession of this will give us the same advantage the enemy has so long had, namely, interior lines, while it will throw them back on exterior lines and permit their attack and defeat in detail. If General ROSECRANS shall be successful in his work, it will change the whole nature of military combinations and operations over the whole theatre of war. ROSECRANS' advance from the old position at Tullahoma and Winchester was commenced a fortnight ago, but the absence of details as to the lines of march leaves us in darkness as to a manœuvre of great military interest. The right column (McCOOK'S corps) appears to have moved by way of Winchester and Cowan, striking the river at Bellefonte, Ala., twelve miles west of Stevenson. The

AUGUST 29, 1863.

UNITED STATES ARMY AND NAVY JOURNAL;

A WEEKLY NEWSPAPER, DEVOTED TO THE INTERESTS OF THE ARMY AND NAVY, AND TO THE DISSEMINATION OF CORRECT MILITARY INFORMATION.

On Thursday, the 27th of August, the undersigned will commence the publication, under the above title, of a weekly newspaper, devoted to military and naval affairs and to the discussion of subjects relating to the interests of the United Service. The ARMY AND NAVY JOURNAL is established in the interests of no party; it will be controlled by no clique. Its independence will be absolute. Avoiding all personal and political bias, its influence will be directed solely to the inculcation of sound military ideas, and to the elevation of the public service in all its departments. Its pages will be devoted to impartial military criticism by competent authorities, to the dignified discussion of topics coming within the scope of its observation, and to a full and reliable record of all subjects of interest to those in any way connected with military or naval affairs, or interested in the art of war. The Department of Engineering, which now has so intimate an association with warlike operations, will receive adequate attention in this connection, and the interests of our Commercial Marine will also have an appropriate place. Among other matters the columns of the JOURNAL will contain from week to week:

1st. Full official lists of all appointments, promotions, changes of station, deaths, resignations, dismissals, and other changes in the *personnel* of the two services.

2d. A full and reliable record of all active operations by the Army and Navy.

3d. A summary of all official orders proper for publication.

4th. A full account of the operations of the Coast Survey and the Revenue Service, and of all changes among the officers of these two departments.

5th. Changes in the medical department of the two services, with matters relating to military hygiene, surgery and the sanitary condition of the Army and Navy.

6th. Descriptions of inventions and improvements relating to the Art of War, and of experiments and discoveries illustrative of military science in this country and abroad.

7th. Narratives of military and naval exploits and adventures; correspondence from members of the two services. Answers to questions in regard to difficult or disputed tactical matters, or other subjects suggested by correspondents.

8th. An account of important movements of foreign armies and navies, with notices of changes in the *personnel* of the services of foreign nations.

9th. Criticisms upon current literature and art, of interest to the Army and Navy.

10th. Articles upon military and naval engineering.

11th. Station of the Naval vessels in commission; report of Navy Yards, and movements of foreign naval vessels.

12th. Editorial discussions upon subjects of interest to our soldiers and sailors.

A summary, in short, of whatever occurs in all parts of the world of value to our Army and Navy. No effort will be spared to make the JOURNAL complete in all its parts, and communications on any subject within its province are at all times invited from those interested in the Art of War. It shall be the aim of the Proprietor to make it not only a complete Military and Naval gazette, but at the same time a high-toned, reliable, lively journal, which will be read with interest by the families and friends of those connected with the public service and by the great body of the intelligent public.

The importance which Military and Naval affairs have assumed in the United States imperatively demands that they should have in the press an adequate representative, which, by its ability, entire impartiality in the discussion of subjects coming under its notice, its official recognition and thorough devotion to the National Union, shall commend itself to the public and to the Army and Navy, and become a necessity in every tent, barrack, hospital and ward-room. The JOURNAL is established in obedience to such a demand, and it shall be the purpose of the proprietor to make a paper which our soldiers and sailors will be proud to recognize as their organ, and which shall be unexcelled in completeness and ability by any of its class in the world. Arrangements for editorial aid have been made with some of the most competent writers on Military and Naval affairs in the country, and for such official and departmental assistance as will secure to the JOURNAL early and complete gazettes of changes, orders, &c. The undersigned in completing his arrangements for the inauguration of the JOURNAL has the valuable co-operation of many experienced officers and of a large number of patriotic gentlemen outside of military life. With their earnest sympathy and cordial support he is able to establish the paper upon such a basis as will ensure its success. As far as it has been communicated to them, the project for the establishment of the JOURNAL has been hailed with the greatest satisfaction in the Army and Navy. Already, in advance of publication, numerous expressions of the most earnest sympathy with the enterprise have been received from officers high in command; and the proprietor, in a large advance subscription list, has received abundant assurance that the JOURNAL will meet with the approval of the two services.

The terms of the paper will be FIVE DOLLARS A YEAR, PAYABLE IN ADVANCE. It will be published in a large-sized quarto sheet of 16 pages, convenient for binding, and printed in the best manner on fine book paper. This will furnish a yearly volume of over 800 pages, filled with information of indispensable importance to every soldier or sailor ambitious of improvement in his profession, as well as to every man desirous of taking an intelligent view of the military operations now absorbing universal attention. Subscriptions and communications should be addressed to the UNITED STATES ARMY AND NAVY JOURNAL, New York.

W. C. CHURCH, Proprietor,
(Late of the Staff of Maj. Gen. Silas Casey),
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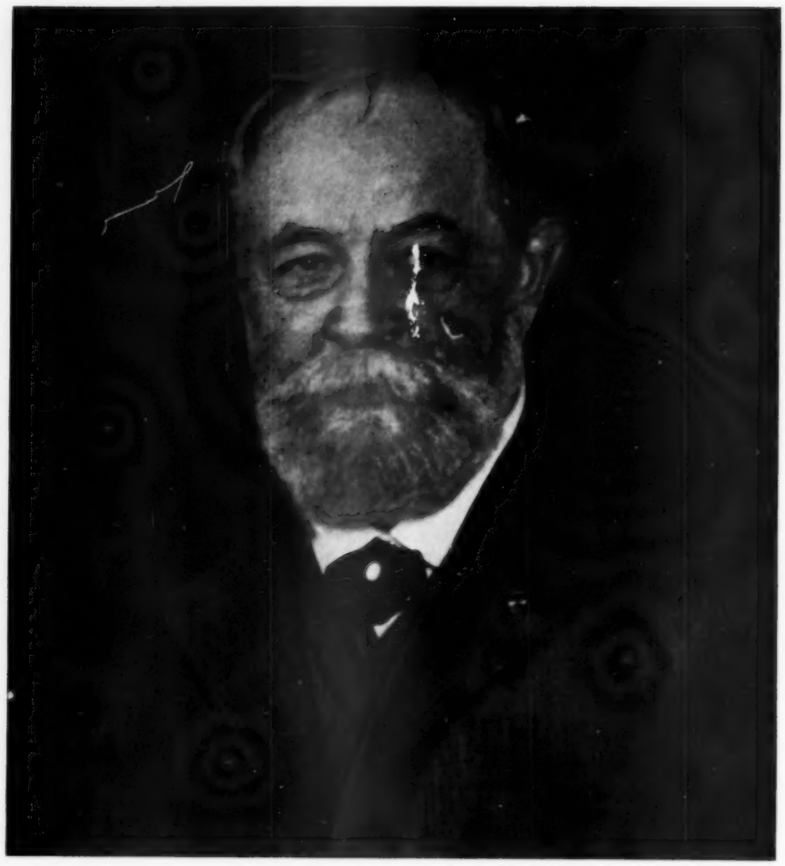
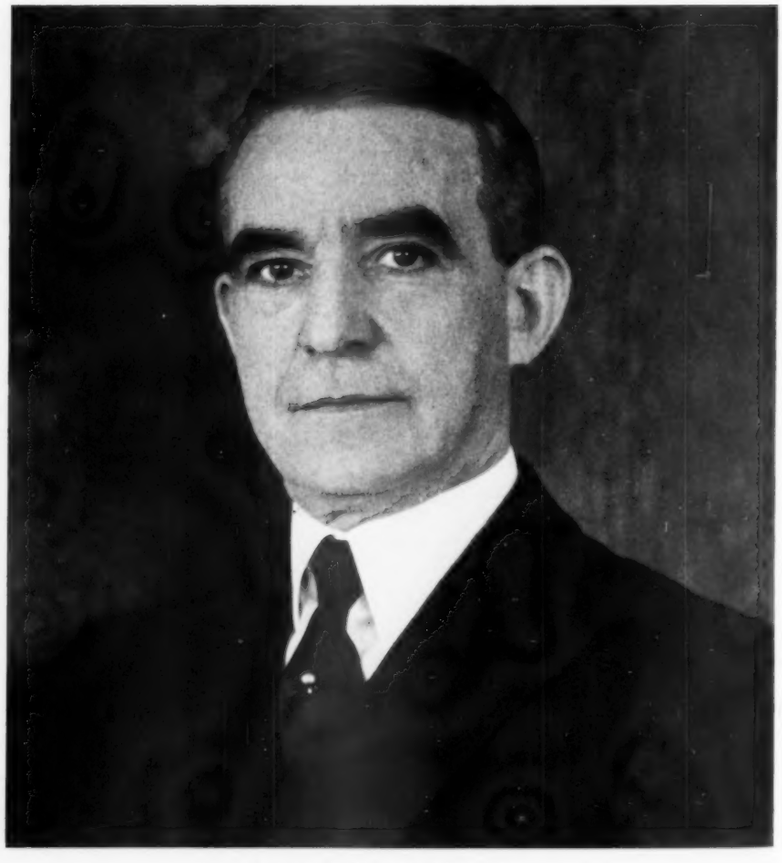


COL. WILLIAM CONANT CHURCH
Founder of the ARMY AND NAVY JOURNAL



COL. JOHN CALLAN O'LAUGHLIN
Present Publisher, ARMY AND NAVY JOURNAL

Three-Quarters of a Century
in the
Army and Navy Journal

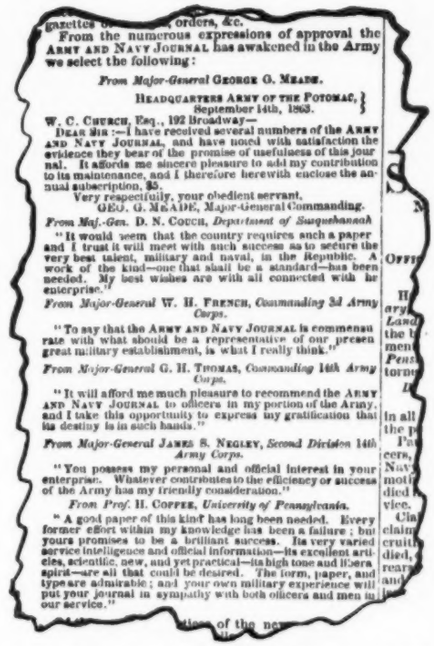
SEVENTY-FIVE years ago, in New York City, Captain William Conant Church, a young newspaper man of twenty-seven, brought up in the noblest traditions and highest ideals of his profession, and inspired by a love for our armed services and an impassioned zeal for the welfare of their members, published the first issue of the ARMY AND NAVY JOURNAL. For his creed, he adopted the following tenets:

> "THE ARMY AND NAVY JOURNAL will be published in the interest of no party; it will be controlled by no clique. Its independence will be absolute. Its interest will be directed solely to the inculcation of sound military ideas and to the elevation of the public service in all its departments."

Almost immediately, the ARMY AND NAVY JOURNAL won the confidence of the services. Under the candlelights in their tents and beside the glowing embers of their campfires, Union soldiers, hungry for reliable news sympathetically interpreted, and eager for bits of information of comrades in other sectors, of results in battle and of prospects of peace, pored over columns of the ARMY AND NAVY JOURNAL. Between watches, men of the Union Navy paused and brought out of the lockers of our fighting ships this newly born JOURNAL which fought for their well-being and morale while they blockaded the South, fought in our Bays and Rivers, maintained lonely vigils in the waters of the South Atlantic and the Gulf of Mexico.

Service faith, won in 1863, has continued throughout the seventy-five years of its history. To the patriotic precepts declared in the first issue, there has been constant and strict adherence. Generation after generation of our armed forces have learned to depend on the ARMY AND NAVY JOURNAL for the accuracy of its military news, for the inspiration of its editorial comments, for the intimacy of its personal notes and for the reliability of its advertising firms. Today, as seventy-five years ago, it remains loyal to the ideals of National Defense and faithful to the traditions of fair and honest journalism.

Born in the throes of great national anguish, the ARMY AND NAVY JOURNAL filled an immediate need in the hearts and minds of our battle-scarred veterans on land and sea. The States were at war among themselves. Less than two months before its appearance, the battle of Gettysburg had been fought. A turning point had been reached, but there still lay ahead Vicksburg, Chickamauga, Chattanooga, the Wilderness, New Orleans and other battles upon whose final outcome the fate of America still hung in the balance. For the Northern Navy, vigilantly guarding almost three thousand miles of Confederate coastline, many difficult sea operations still had to be made before victory would perch on the eagles of the Union flags and banners.



gazettes of ... orders, &c.

From the numerous expressions of approval the ARMY AND NAVY JOURNAL has awakened in the Army we select the following:

From Major-General GEORGE G. MEADE.

HEADQUARTERS ARMY OF THE POTOMAC, September 14th, 1863.

W. C. CHURCH, Esq., 192 Broadway—

DEAR SIR:—I have received several numbers of the ARMY AND NAVY JOURNAL, and have noted with satisfaction the evidence they bear of the promise of usefulness of this journal. It affords me sincere pleasure to add my contribution to its maintenance, and I therefore herewith enclose the annual subscription, $5.

Very respectfully, your obedient servant,
GEO. G. MEADE, Major-General Commanding.

From Maj.-Gen. D. N. COUCH, *Department of Susquehanah*

"It would seem that the country requires such a paper and I trust it will meet with such success as to secure the very best talent, military and naval, in the Republic. A work of the kind—one that shall be a standard—has been needed. My best wishes are with all connected with he enterprise."

From Major-General W. H. FRENCH, *Commanding 3d Army Corps.*

"To say that the ARMY AND NAVY JOURNAL is commensurate with what should be a representative of our present great military establishment, is what I really think."

From Major-General G. H. THOMAS, *Commanding 14th Army Corps.*

"It will afford me much pleasure to recommend the ARMY AND NAVY JOURNAL to officers in my portion of the Army, and I take this opportunity to express my gratification that its destiny is in such hands."

From Major-General JAMES S. NEGLEY, *Second Division 14th Army Corps.*

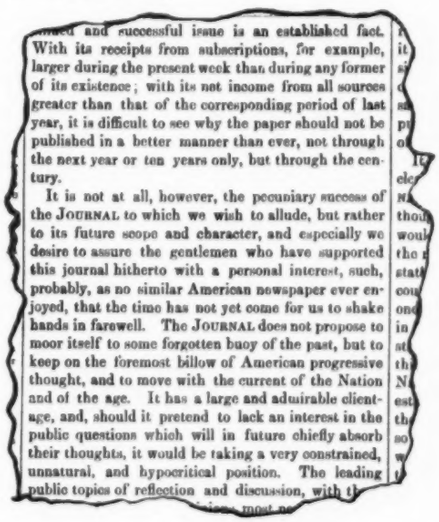
"You possess my personal and official interest in your enterprise. Whatever contributes to the efficiency or success of the Army has my friendly consideration."

From Prof. H. COPPEE, *University of Pennsylvania.*

"A good paper of this kind has long been needed. Every former effort within my knowledge has been a failure; but yours promises to be a brilliant success. Its very varied service intelligence and official information—its excellent articles, scientific, new, and yet practical—its high tone and liberal spirit—are all that could be desired. The form, paper, and type are admirable; and your own military experience will put your journal in sympathy with both officers and men in our service."

...tion of the ne...

From its first issue the Army and Navy Journal won the support and acclaim of the services as evidenced not only by letters of approbation (reproduced above from the Army and Navy Journal of November 28, 1863) but also by its success over that of the short-lived "Official Gazette" issued under the aegis of Secretary of War Stanton who did not approve of Colonel Church's independent publication. In '65, when the war was over, subscribers asked the publishers if the Army and Navy Journal intended to continue. The answer was published in the issue of August 19, 1865, from which the excerpt below is reproduced, and has been borne out by its subsequent continuous publication and will continue through the centuries to come.



...ssful issue is an established fact. With its receipts from subscriptions, for example, larger during the present week than during any former of its existence; with its net income from all sources greater than that of the corresponding period of last year, it is difficult to see why the paper should not be published in a better manner than ever, not through the next year or ten years only, but through the century.

It is not at all, however, the pecuniary success of the JOURNAL to which we wish to allude, but rather to its future scope and character, and especially we desire to assure the gentlemen who have supported this journal hitherto with a personal interest, such, probably, as no similar American newspaper ever enjoyed, that the time has not yet come for us to shake hands in farewell. The JOURNAL does not propose to moor itself to some forgotten buoy of the past, but to keep on the foremost billow of American progressive thought, and to move with the current of the Nation and of the age. It has a large and adduirable clientage, and, should it pretend to lack an interest in the public questions which will in future chiefly absorb their thoughts, it would be taking a very constrained, unnatural, and hypocritical position. The leading public topics of reflection and discussion, with th...

Peace came in 1865. The ARMY AND NAVY JOURNAL, faithful to its creed, brought out in its columns the lessons of unpreparedness in 1861 and took up cudgels for sane National Defense. If we had had but fifty thousand men in 1861 instead of the insignificant force of 15,215, the war between the States might have been avoided, it pointed out in its editorials. It urged that the efficient and experienced Army and Navy of 1861-65 be not broken up and scattered and its morale destroyed. It plead for a force adequate to meet our needs in an America faced by grave dangers. America's duty in 1868 to remain well armed was quite patent. The Archduke Maximilian had set up a government in Mexico. We called his attention in polite diplomatic notes to the Monroe Doctrine, upon which the United States for thirty years had insisted as the policy for peace in the western hemisphere. He paid no attention. He knew we were too busy fighting each other, seriously to concern ourselves with affairs beyond the Rio Grande. He knew that diplomatic threats that cannot be supported by military effort deserve little or no attention.

When he learned, however, that Phil Sheridan with several divisions of veterans had marched to Texas and had mobilized close to its southern border, and that the Union Navy, then perhaps the strongest in the world, was concentrating men-of-war close to Mexican waters, Maximilian withdrew.

Here was cogent proof that a strong Army and Navy are our best guarantees for peace. Here was a lesson for Americans to take to heart. The ARMY AND NAVY JOURNAL carefully pointed out the value of our armed services in this great crisis and again urged the retention of an army and navy of adequate means; but its advice went unheeded.

From 1867 onward, we find the Army and Navy steadily growing weaker until both reached their nadir about 1881 when they began to pull themselves up by their own bootstraps. The Army, reduced to twenty-five thousand soldiers, scattered along the deep river valleys, over the great prairies and steep mountains of the west, had the titanic job of establishing peace and order among the Indians.

Poorly equipped, poorly clothed, isolated for months at a time, fighting blizzards and zero weather in winter, struggling against flies, mosquitoes and disease in summer, this brave band of Regulars ultimately achieved peace but not, however, without tremendous sacrifice. Veterans of these campaigns still recall the heartbreak and the grief that fell upon the Army after the Fetterman and Thornburg affairs and the consternation that shook the ranks after the massacre of Custer and his band.

To these camps and posts on the isolated frontier, officers of the Army brought their

wives and their families, who shared their hardships. Boys, some of them still on the active rolls of the Army, were brought into the world during these frontier days. Girls, many of them who later became Army wives, grew up in an environment where death had become an almost daily visitor.

Despite these hardships, the Army fought loyally and died bravely. Only when Indian massacres of great magnitude occurred, did waves of storm and protest arouse our people to the state of affairs among their armed forces. The people of this country were too busy industrially and commercially to give the Army the attention it deserved. The Army was practically forgotten.

Almost alone, as the still small voice in the wilderness, the ARMY AND NAVY JOURNAL kept up the fight for the ideals of National Defense laid down in its creed. It continued to plead for a larger Army capable of meeting the vicissitudes of life on the western frontier. By train and buckboard, the ARMY AND NAVY JOURNAL arrived weekly in these isolated garrisons to breathe encouragement and to strengthen morale. Often, at the end of a day's campaign, from their dispatch cases and saddle bags, the hard fighters of our Army took out their neatly folded copies of the current issue of the ARMY AND NAVY JOURNAL to read of the joys and tribulations of comrades in arms and discuss among themselves the future of the country they loved so dearly and to whose safety they had dedicated their lives so faithfully.

Not only on the western frontier, but throughout our country, strife, strike and turmoil ran rampant during the post Civil War period. In our southern states, delicate situations brought on by near-sighted politicians had to be solved and handled by the men in the Army, many of whose sympathies extended to unfortunate brethren toward whom they held no grudge or bitter feelings. Race riots, mob lynchings and lawless demonstrations in the South had to be quelled and upon the Army fell the responsibility of maintaining order without any unnecessary injury to life and property.

...on closed.

The whole fight was gallantly conducted on both sides. The heroism of Admiral FARRAGUT in pitting his wooden ships against the formidable forts and the huge iron-clad, is noteworthy. The enemy's fleet, also, only surrendered after a desperate resistance, and the ram *Tennessee* went through a terrible engagement. So hot was the opening fire on Fort Morgan that the gunners were driven from the guns and the fort almost silenced, until the fleet had passed. Our loss in the whole affair was about 50 killed and 100 wounded, while about 100 went down with the *Tecumseh*, making a total of from 240 to 250. The Flagship suffered most severely, losing 19 killed and 23 wounded. Of our vessels, the *Tecumseh* was sunk, the fine dispatch-boat *Phillippi* was burned (the fate of her crew being as yet unknown), the *Hartford* badly crushed by the prow of the *Metacomet*, while each ship was trying to run down the *Tennessee*, and the *Oneida* badly injured in her works by the *Tennessee*, and carried off into shoal water by her consorts to avoid sinking. The other vessels suffered comparatively little. The enemy lost less than 40 in killed and wounded in his fleet, the *Selma* suffering most. The ram had but three killed. The enemy lost his ram and the *Selma*, and acknowledges that "the *Gaines* retir-
"ed to Fort Morgan in a sinking condition." The *Morgan* was the only vessel of the four that escaped. He claims that the contest was one of 212 guns against 32; but he does not reckon his forts, to whose fire our fleet was constantly exposed.

Whi...action was ...al GRAN...

The Army and Navy Journal, in its issue of August 20, 1864, reports the Battle of Mobile Bay.

AN ingenious but visionary rebel claims to have invented a flying machine, which may be used with terrible effect against an enemy. He calls it the "Artisavis," or "Bird of Art," and he believes that by the use of a considerable number of them all of the Yankee armies now upon Confederate soil and all their blockading fleets may be driven off or destroyed. To effect this, he proposes to station a thousand of these machines at a distance of five miles from the hostile camp or fleet, and send them thence into the air, each armed with a 50-pound explosive shell, to be dropped from a safe elevation upon the enemy! The Birds are then to return for the purpose of re-loading. The inventor believes that in this manner an army or fleet could be destroyed in a very few hours. The ...ngress, ...ever, ...plied to ... ...merits of ...

(From the Army and Navy Journal of January 23, 1864.)

In other parts of the country, disturbances of equal magnitude necessitated the use of federal forces. Industry and commerce became paralyzed by the railroad strikes of 1877. Our mining regions and our railroad centers became hotbeds of labor disputes and the scenes of riot and bloodshed. Out in our new territories, in New Mexico, Arizona, Utah, Wyoming and Washington, the intolerances for foreigners and especially for Orientals, and the agitations of irresponsible labor leaders, time and again brought on situations which necessitated a call for federal troops. The long series of difficulties was climaxed by the severe railroad strikes of 1894, which tied up interstate commerce, interfered with the transportation of the United States mails and ended only at the intervention of federal troops.

This was a period of petty political and general inefficiency in local government and local police proved incapable of handling ordinary problems. Time and again, the Army was called upon to intervene. Sometimes a full battalion, but seldom more, usually, simply a platoon or perhaps even a squad, of American regulars were called upon to face armed, lawless mobs. To the credit of the Army, it must be said that it faced the most distasteful of the duties imposed upon a soldier calmly and bravely. In practically every instance, the mere appearance of Federal troops in an area of disorder was enough to quell a riot and restore peace. The reputation that Regulars had for their ability to shoot and shoot straight, not only with accurate rifles but with fair minds and stout hearts, accomplished the desirable results when all other efforts at establishing peace had failed.

The Army had proved itself an asset to our country, not only in defending our shores against invasion but in maintaining peace at home. While engaged on these many frontiers, the size of the Army grew no larger, the pay became no more commensurate with responsibility and even training had fallen to a low level.

When, in 1876-77, Congress even failed to vote the annual appropriation for the pay of the armed services, the men and their families faced dire consequences. To their rescue, however, came the ARMY AND NAVY JOURNAL. It solicited the aid of a syndicate of bankers who pledged themselves to an advance of a million and a half dollars on pay accounts so that the Army officers and their families might be able to meet their pressing needs of food, supplies and clothing.

In 1876, when the widows and orphans of those who followed General Custer to his death, came to need, the ARMY AND NAVY JOURNAL started a subscription in their behalf and brought aid and succor to the suffering families. In 1878, the ARMY AND NAVY JOURNAL collected and distributed funds for the relief of men and women in the service who had suffered from the deadly scourge of yellow fever. Throughout this period, the needs of the Army became synonymous with slogans for relief, urged by the ARMY AND NAVY JOURNAL.

Training, too, needed encouragement and through the efforts of the ARMY AND NAVY JOURNAL the National Rifle Association was formed, which has had a tremendous influence upon target practice in the services.

It would be impossible in this chronicle to list fully all the contributions of the ARMY AND NAVY JOURNAL of the last seventy-five years to National Defense and to the morale of the armed services. Suffice it to say, the cause of the Army and the Navy was always the cause of the ARMY AND NAVY JOURNAL.

While our small Army was fighting to maintain peace at home, our little Navy was trying to establish our prestige abroad. The proud vessels of the Civil War Navy, which traveled to European and Asiatic ports in the first five years after the cessation of hostilities and had created good will for the United States all over the world, were allowed to fall apart in the navy yards. Ironclads were rotting from disuse. For nearly twenty years, the Navy was without serviceable armored ships.

Shrunk in size and depleted in manpower, it nevertheless loyally and boldly carried out its peace-time missions. Naval officers invested with diplomatic powers performed meritorious services in the world's capitals. Following the earlier example of opening intercourse with Japan in 1854, it succeeded in breaking down the barriers to Korea in 1882. The period between 1861 and 1898 was also one of great political disturbances in Central and South America and the mere presence of a naval ship often stabilized difficult situations.

There was the case of the uprising in Valparaiso, Chile, on October 16, 1891, when a mob attacked a liberty party from the cruiser Baltimore on the streets of the city. Two of

THE MURDER OF THE PRESIDENT.

DISPATCHES FROM MR. STANTON.

WAR DEPARTMENT, WASHINGTON, April 15—1:30 A. M.

Major-General DIX, New York:

This evening, at about 9:30 P. M., at Ford's Theatre, the President, while sitting in his private box with Mrs. Lincoln, Miss Harris, and Major Rathbuna, was shot by an assassin, who suddenly entered the box and approached behind the President. The assassin then leaped upon the stage, brandishing a large dagger or knife, and made his escape in the rear of the theatre. The pistol ball entered the back of the President's head and penetrated nearly through the head. The wound is mortal. The President has been insensible ever since it was inflicted, and is now dying.

About the same hour, an assassin, whether the same or not, entered Mr. Seward's apartments, and, under pretence of having a prescription, was shown to the Secretary's sick chamber. The assassin immediately rushed to the bed and inflicted two or three stabs on the throat and two on the face. It is hoped the wounds may not be mortal. My apprehension is that they will prove fatal. The nurse alarmed Mr. Frederick Seward, who was in an adjoining room, and he hastened to the door of his father's room, when he met the assassin, who inflicted upon him one or more dangerous wounds. The recovery of Frederick Seward is doubtful.

It is not probable that the President will live through the night.

General Grant and wife were advertised to be at the theatre this evening, but he started to Burlington at six o'clock this evening.

At a Cabinet meeting, at which General Grant was present, the subject of the state of the country and the prospect of a speedy peace were discussed. The President was very cheerful and hopeful, and spoke very kindly of General Lee and others of the Confederacy, and of the establishment of government in Virginia.

All the members of the Cabinet except Mr. Seward are now in attendance upon the President.

I have seen Mr. Seward, but he and Frederick were both unconscious.

EDWIN M. STANTON, Secretary of War.

WAR DEPARTMENT, WASHINGTON, April 15—3 A. M.

The assassination of President Lincoln, reproduced from the Army and Navy Journal of April 22, 1865.

Some leaders in the Confederate States of America. President Jefferson Davis (1) and General Robert E. Lee (2) led their nation during the War Between the States. Admiral Franklin Buchanan (3) was the leader of the Confederate Navy. Among the leaders of the Confederate States Army were General Pirre Gustave Toutant Beauregard (4), General Joseph Eggleston Johnston (5), General John Bell Hood (6), General Edmund Kirby Smith (7), General Braxton Bragg (8), Lieutenant General Thomas Jonathan Jackson (9), Lieutenant General Richard Stoddert Ewell (10), Lieutenant General James Longstreet (11), Lieutenant General Jubal Anderson Early (12), Lieutenant General Daniel Harvey Hill (13), Lieutenant General William Joseph Hardee (14), and Lieutenant General Nathan Bedford Forrest (15).

the Americans were killed and eighteen wounded.

Chile had just passed through a revolution and the successful party harbored ill-feeling against the United States because we kept out of their local fights and tried to maintain strict neutrality. Moreover, our minister had angered the Chileans because he granted an international law right of asylum in the American legation to the defeated leaders of the recognized government. As representatives of the United States, the men of the Navy had to bear the full brunt of the Chilean hostility.

The incident, reported in the United States, immediately brought protests from our government and a demand for redress. Many persons in America even called for war.

While governments swapped notes and debated, the members of the American Navy, placed in a most delicate position, held their ground with calm and dignity. Their dilemma was obvious. A mistake in judgment might have precipitated war. Failure to act firmly might have given rise to further insult. Days passed. The Chileans grow bolder. They maneuvered torpedo boats at high speed and almost collided with our vessels. They fired night rockets and barely missed hitting an American ship. When our landing parties came close to shore, they stoned our boats.

At this time, Commander R. D. Evans, in charge of the gunboat Yorktown, arrived and immediately called a halt to these proceedings. He told the Chileans that if his ship were injured he would immediately open fire. Evans showed he could be diplomatic as well as firm. The hostile demonstrations ceased. The critical episode passed. The two governments came to an agreement and the Chileans paid indemnity.

A somewhat similar incident developed in Rie de Janeiro in 1894. Again victorious revolutionists had become annoyed with American neutrality during the struggle. In retaliation the Brazilian navy forbade American merchant ships from coming to the city piers. It threatened to fire upon them if they failed to obey these orders. Rear Admiral Benham of the United States Navy told the merchant ships to ignore the restriction and cleared his own squadron for action. The Brazilian navy was advised in no uncertain terms that if it interfered with American shipping our Navy would open fire. The effect was instantaneous. The situation was stabilized. The Navy was commended for its vigorous and effective protection of American commerce.

How the Army and Navy were able to maintain their morale and keep alive the spirit and traditions of their services during the trying periods of national neglect, is almost a miracle. It is a high compliment to the personnel of both services that the men never flinched in their duty and made up in courage what they lacked in armament and equipment. When appropriations reached their lowest level, those who remained in the services took up a few notches in their belts and strived more valiantly.

About 1881, signs of a renaissance in the art and science of military and naval warfare began to manifest themselves in both services. The period 1881-1898 was featured by intensive study and experiment. This is the time when the foundations were laid for the school systems of the Army and Navy. These are the years when officers of the Navy, revolutionized standards and requirements for up to date naval vessels. When American industry lacked facilities for giving the Navy what it wanted, Naval officers, themselves, specified designs and supervised manufacture and construction. They inspected, tested, installed and operated their own equipment. They laid the foundations for the steel industry of today. The fruit of their labor was felt in

business throughout the country and was manifested in a stronger and more efficient fleet.

While the services studied, maneuvered and experimented, the ARMY AND NAVY JOURNAL extended to their members the opportunities to discuss the merits of innovations and the ability of the machines to meet the new situations that war may demand.

In 1898, the services, though not ready for a war of major proportions, gave a creditable account of themselves. In personal bravery and heroism, there was little to match the exploits of our men on land and sea in Cuba, Puerto Rico and in the far off Philippines. The Army had not perfected its supply. It had not developed fully its organization and the lessons of unpreparedness again had to be called to the attention of the American people and again the ARMY AND NAVY JOURNAL was in the vanguard of those who preached and plead for adequate national defense.

Our Navy gave a splendid account of itself in 1898 and the names of Dewey and Sampson forty years ago were bywords in every American household.

Again, a shot from America had been heard around the world. But this time the guns were fired from Manila Bay. Out of Dewey's victory came a series of events which led to the acquisition and annexation of the Hawaiian and Philippine Islands, of Guam and Samoa and of the insistent demand upon a trans-oceanic canal. America had awakened to the affairs of the world and to the important part in them that its Navy and Army had played.

The war with Spain brought new responsi-

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LeROY WHITMAN
present Editor of the Army and Navy Journal.

bilities and new fields for service in the Army and Navy. To far off Manila and Zamboanga, to Nome, Alaska, to Havana and San Juan, our Army and Navy were sent to establish order, remove squalor and disease and to bring the blessings of America to other peoples. Health, sanitation, education and never exploitation were the principles that guided the efficient administration of American colonies. In our officers and enlisted men, peoples unaccustomed to self-government found guiding genius and helping hands.

Scattered to the four corners of the earth, the men of the services found in the ARMY AND NAVY JOURNAL a link that united them all, a voice that spoke their minds and a heart that understood their problems.

In the years that intervened between 1898 and 1917, our Army and our Navy accomplished significant works for the peace and security of America. Our Army engineers and our Army doctors made possible the construction of the Panama Canal joining the Atlantic and Pacific Oceans — a dream of several centuries of American history. In the nearby waters the United States Navy proved an invaluable ally.

For example: when in 1901 Germany persuaded England and Italy to join her in naval demonstrations against Venezuela, ostensibly to settle some debts but in reality to challenge our Monroe doctrine and perhaps to threaten our plans for a trans-oceanic canal, President Roosevelt ordered the mobilization at Culebra near Puerto Rico of all American naval vessels with Admiral Dewey in command. Admirably the fleet responded. With the Navy ready, President Theodore Roosevelt urged upon the Kaiser the arbitration of the Venezuelan question. The latter got the hint. A show of force plus diplomacy had saved the peace of America.

The events of the World War are still too fresh in our minds for a study of the influence of the ARMY AND NAVY JOURNAL upon the members of the armed forces. Suffice it to say that there was hardly a camp in the United States, an American unit in France, Italy and even northern Russia and Siberia, an armed vessel at sea or in port, which did not include among its members subscribers to the ARMY AND NAVY JOURNAL. True to its traditions, the ARMY AND NAVY JOURNAL fought for the interests of our men on land and sea, wherever they were stationed and whatever they were doing. It has been the guardian of the rights of the Army, the Navy, the Marine Corps and the Coast Guard.

The United States Marine Corps, a component of the Navy, is worthy of special mention on its own accord. "Semper fidelis," it has taken a prominent part in every war in which the United States has been engaged and has served both on land and sea. In the last seventy-five years, we find Marines marching beside the Army to the relief of Peking in 1900, in the establishment of law and order in San Francisco after the earthquake in 1906, in upholding the dignity and prestige of the American flag at Vera Cruz in 1914, in making history on the battlefields of France as a brigade in the Second Division in 1917-18, and in furnishing an efficient quota of officers to help its sister service to conduct the Civilian Conservation Corps camps in 1933 and thereafter.

As to its services with the Navy, the frequent appearance of the cryptic headline, "The Marines have landed and have the situation well in hand," tells the story of their achievements and the high regard that is held for them by the press and the American public. In China, in Cuba, in Nicaragua, in Mexico, in Panama, in Haiti and in Santo Domingo, the Marine Corps has proved itself loyal to its traditions and has brought order out of chaos in all corners of the globe.

The United States Coast Guard, growing out of the merger of the Revenue Cutter and Life Saving Services in 1915, has served loyally, faithfully and all too unostentatiously the last seventy-five years. Operating as a part of the military forces of the United States, it participated in all of our major wars. At the battle of Manila Bay, the cutter McCulloch served with Admiral Dewey's fleet. During the World War, Coast Guard vessels fought submarines and performed secret and

TO THE ARMY AND NAVY.

It is important that the country should not be misled as to the value of professional training, and we shall be glad of every hint that may help us to make this clear. It will be remembered that shortly after the close of our Civil War General Sherman issued a formal invitation to the Army to communicate to the "Army and Navy Journal" their ideas on certain professional subjects. He also sent us in advance of its publication in book form the closing chapter of his "Memoirs," containing the general conclusions from his experience in war. Earlier in our history, during the Civil War, General McClellan favored us with a series of articles on the military topography of the United States, and other distinguished soldiers and sailors of our own and other services have set the example of presenting professional opinions and facts through the columns of the "Army and Navy Journal." We hope that those who are now learning on the field of battle the practical lessons of war will similarly favor us.

We have never known a time when it was so difficult to obtain exact information concerning military movements in the field as it is now. The only official reports of the Army operations before Santiago that we have been able to obtain thus far is the report of General Lawton, giving a list of his killed and wounded, and that of Cavalry General Wheeler, giving an account of the preliminary operations at the time our Army landed in Cuba. This is, no doubt, due in part to the disruption of the ordinary machinery of Army administration following the heavy loss inflicted upon officers, not only by the casualties of the battlefield, but by the prostrating influence of campaigning in the semi-tropics, and the outbreak of serious disease in our camps.

We are indebted to various correspondents for facts and suggestions as to the progress of the war thus far, and hope that others will favor us with similar information. We shall be glad of every hint that will enable us to describe clearly what has been done so as to give proper credit to individuals and to draw from our experiences the professional lessons they teach. It seems to us especially important that officers of the Regular Army should overcome their habitual modesty and give us all the help they can in this direction. We cannot tell more than we know, and we need the help of all who have taken part in military operations to present a full account of what has been done, and to deduce from the facts their appropriate lessons.

What we have been saying applies equally to the Navy so far as relates to the suggestions, we should be glad to receive from them to enable us to present fairly and fully what they have done. The purpose of the daily papers is to select from the great body of facts furnished by our war what is most picturesque and sensational. Our purpose, on the contrary, is to gather from the great mass of facts those that best illustrate the value of professional training and the importance of maintaining our regular establishments at the highest standard of professional efficiency.

The Spanish-American War again brought to the ARMY AND NAVY JOURNAL the task of giving to the services the news they wanted and needed. In its issue of July 30, 1898, the ARMY AND NAVY JOURNAL, as reproduced above told of its policy in war coverage and asked (and received) the cooperation of those engaged in the conflict.

WITH PARKER'S GATLING BATTERY.

(Correspondence of the "Army and Navy Journal.")

In Front of Santiago, July 9, 1898.

It is still almost impossible to receive any mail; last newspapers bear the date June 25. Food is still a much-desired commodity, and tobacco ungetable. Yesterday a thirteen-mile journey to headquarters resulted in procuring one can oxtail soup, one of tomatoes, a tooth brush, second-hand pipe, bottle of lime juice, a little tobacco, shoe strings and a drink of ginger ale, strengthened with a dash of whisky. Stopped at division hospital to see Maj. Sumner Lincoln, of the 10th Inf., who is shot in leg, arm and shoulder, but is as brave, cool and smiling as of yore.

Also saw Lieut. Col. Haskell, of the gallant 17th, who has a fractured thigh, a wound through the chest and one in the arm. Col. Haskell was wounded at El Caney while leading his regiment. The enemy had opened fire on them from cover while crossing an open field; both he and Q. M. Dickenson were wounded, each shot twice. A number of men of Co. C, under Lieut. Roberts, rushed forward to aid them, and three were wounded. Later, after Co. C had fired a number of volleys at the Spaniards, they were taken to the rear, and, on the way, Lieut. Dickenson was again shot, dying that night.

The wounded are doing remarkably well. They should, and probably will, be taken North (as they have been since this was written.—Editor).

We made another elegant "sneak" to within 400 yards of the enemy's line last night, and can now see the whites of the exasperated Dons' eyes immediately in front. We advanced our trenches so quickly that we dug around a picket who begged for his life and was quieted with fine boiled green coffee, lobscotch, tack and bacon, the best we have, and the best he has had for a month.

The question never is "Who will [illegible]"

Some of the "correspondence" received and published by the ARMY AND NAVY JOURNAL during the Spanish-American War.

patrol duty in the European war zone. Its members served with distinction in practically every phase of naval activity.

In time of peace, the Coast Guard has maintained its constant readiness for war. In an emergency, it is prepared to pass into the naval establishment on twenty-four hours' notice.

When not engaged as a member of the national defense team, it has occupied itself in saving life and property at sea. It has cruised along the coasts in most dangerous weather and has rendered aid to vessels in distress. It has protected our shores against smugglers. It has cleared derelicts and obstructions to navigation. Since the Titantic disaster, it has maintained an international ice patrol in the Atlantic and to its eternal vigilance we largely attribute the fact that not a single life has been lost by collision with icebergs in the North Atlantic since 1912.

Time and again, in domestic crises, the nation has turned to the Coast Guard and has never found it wanting. In enforcing the unpopular prohibition laws, its members did not stop to ask the reason why, but performed their duties honorably and faithfully. In the Mississippi floods of 1927, the Coast Guard was sent into the interior of our country to save life and property and it performed its job in a most creditable manner.

The United States indeed is fortunate in the tradition, spirit and morale of its armed forces and today, as always, the ARMY AND NAVY JOURNAL is happy to continue in its traditional role to uphold and maintain their rights before the body of public opinion.

The improvements in Army housing, the acceleration of promotion, the merits of elimination methods, the campaign for increases in pay and allowances, the need for more liberal widows' pensions, are some of the major issues for the services that have received the vigilant attention of the ARMY AND NAVY JOURNAL. Today and tomorrow, just as in the past, the present publisher and editor of the ARMY AND NAVY JOURNAL strive to carry on the broad general policies laid down by the founder of their newspaper seventy-five years ago.

So far, we have discussed in a general way the relationship of the ARMY AND NAVY JOURNAL to the services. Here and there, a little has been said of what our services have done to defend our country in battle. There is a greater and broader utility to the Army and Navy that is worthy of special attention on this occasion. Let us see, therefore, what the Army and Navy in times of peace have done for medical, scientific and industrial development in the United States. Let us see what the Army and Navy have done to make life in America more happy and more prosperous.

Let us begin with the contributions of the services to medicine. The Army and Navy, in ordinary circles, are thought of as engines of death and destruction. Let us see what they have done in the last seventy-five years to save life and reduce suffering.

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MRS. DOROTHY CONE BROWN
present assistant secretary and assistant treasurer of the ARMY AND NAVY JOURNAL.

IN the field of preventive medicine, the Medical Department of the United States Army has stood out preeminently, not only in this country but throughout the world. Perhaps its most spectacular accomplishment is in the practical eradication of the dreaded yellow fever, one of the most deadly plagues that has ever visited mankind. Once Major Walter Reed of the United States Army established the fact that yellow fever was transmitted by mosquitoes, the Army opened an active campaign against their breeding. Immediately it was successful.

Within a few months of this discovery, Havana, one of the pest holes of the western hemisphere, was converted into a tropical paradise. The disease that had ravaged it for one hundred and fifty years, and had baffled expert medical authorities of two continents, was under complete control.

Several years later, when the United States determined to build a canal across the Isthmus of Panama, the discovery of Major Reed enabled the United States to accomplish an engineering feat in which other countries had failed. While the French attempt to join the Atlantic and Pacific had been stopped by the ravages of yellow fever, which decimated the ranks of the workers and filled the Panamanian jungles with premature graves, the job of the Corps of Engineers of the United States Army, under General Goethals, was made relatively simple. Yellow fever, stamped out in Cuba, was eradicated in Panama.

What America accomplished in the Caribbean soon attracted the attention of other nations. Life in the tropics, hitherto doomed to disease and early death, became more healthy and attractive. The great cities of South and Central America received a new impetus. Today, quarantine restrictions on land and sea trade and on national and interstate commerce, which were set up to prevent the spread of the disease, no longer appears so necessary.

Thanks to the Medical Department of the United States Army, the conquest of yellow fever no longer presents a challenge to the medical profession.

Another notable achievement of the Army in medicine is in the stamping out of typhoid fever. Throughout history, this deadly disease had been the special scourge of armies. It wrecked the plans of campaign of both sides in the war between the States. It reduced the effectiveness of our military efforts in Puerto Rico, Cuba and the Philippine Islands.

When typhoid vaccine was developed during the Boer war, the Medical Department of the United States Army was among the first to see its advantages. Typhoid inoculation, introduced into the American Army, immedi-

MARINES FOR CHINA.

The Navy Department is sending marines to China with every possible speed, and Brig.-Gen. Heywood, Commandant of the corps, has been busy in assembling and organizing the battalions for foreign service, which it was desired should aggregate 4,000 men. The Navy Department, however, has found it impossible to send 4,000 marines to China, as arranged recently. To do this would deplete the marine guards of every naval station and nearly every ship. The corps has now about 5,000 enlisted men, and active efforts are being made to recruit it to its full strength of 6,000 men. After carefully considering the matter it has been decided that only 3,000 men will be available for service in China, and enough will be sent from this country to augment the marine force now on Chinese soil to that number. This splendid body in the Chinese troubles has again demonstrated its valor, and has added new laurels to its splendid history.

In addition to the force of marines now in the East, 500 more, under Major William P. Biddle, who was on the Olympia at Manila Bay, are en route for the Asiatic station. The 5th Battalion, numbering 500, under Major Randolph Dickins, who served on the Oregon in the Spanish war, has been formed and will be hurried to China without delay. This battalion is scheduled to sail on July 28 from San Francisco, Cal., and General Heywood intends to have other battalions put en route at regular intervals until the quota of 3,000 for foreign service has been filled. The battalion of marines assembled at Washington, from the several Navy Yards on the Atlantic coast, left Washington July 22 for San Francisco. Secretary Long went to the train to see them off and was much impressed with their soldierly bearing. General Heywood, commandant of the Marine Corps, also witnessed their departure. The [illegible]

The United States Marine Corps adds new laurels to its splendid history. (From the ARMY AND NAVY JOURNAL of July 28, 1900.)

NOTES OF OUR FORCES ABROAD.

General Foch sent the following telegram to General Pershing on Nov. 5: "The operations begun on Nov. 1 by the 1st American Army already have assured, thanks to the valor of the high command and to the energy and bravery of the troops, results of the greatest importance. I am happy to send you my warmest congratulations on the success of these operations."

A dispatch from London, dated Oct. 31, announced that 6,000 American soldiers had arrived at a British port, and that during the trip only fifty cases of influenza were reported. There was but one death. The doctors on the ship believe the successful combatting of the epidemic was due to the fact that every man was compelled to wear a cloth mask during the voyage. There were several fatalities from the disease on the previous voyage of the same ship.

The fighting at Chateau-Thierry and Vaux was conducted by the Infantry, Artillery and Marines of the 2d Division of the 1st American Army, under command of Major Gen. Omar Bundy, writes C. E. Bundy in a letter to the New York Evening Sun, correcting comment in that paper that credited the command to Lieut. Gen. Hunter Liggett. This was prior to the organization of the 1st Army into five corps. General Liggett commanded the 1st Division of the American Army in battle with the German army at Cantigny.

The names of nine American base ports in France, the Service of Supply organizations of which have entered an "On to Berlin" contest to determine which can unload guns, food, clothing and other war material in the fastest time, can now be announced. The veil of secrecy has heretofore covered the names of these ports which are St. Nazaire, Bordeaux, Havre, Nantes, Marseilles, Rouen, Brest, La Pallice and Rochefort.

The clothing needs for the Army in France during the coming winter are provided for in the following supplies which arrived at a French port from the United States late in October. These include woolen blouses, 2,400,000; woolen drawers, 3,520,000; woolen shirts, 2,325,000; woolen undershirts, 1,650,000; woolen stockings, 3,500,000; breeches, 1,000,000; caps, 109,000; woolen gloves, 2,100,000. Also there are these other items: Leather jerkins, 400,000; one fingered mittens, 365,000; overcoats, 300,000; cloth putters, 1,000,000; shoes, 2,325,000; rubber boots, 575,000. These constitute a reserve after the normal needs of the Army have been taken care of.

A cable from the head offices of Cox and Co.'s Bank, London, announces that arrangements have now been made whereby all American Y.M.C.A. huts in France will cash U.S. officers' checks on Cox and Co.

In the second battle of the Marne, July 15-23, the 38th U.S. Infantry, Col. U. S. McAlexander commanding, in nine days captured prisoners from nine enemy regiments and secured from enemy positions along its front identifications of twenty-one separate and distinct regimental and other units. This record has been deemed deserving of special mention.

The number of sick and wounded soldiers landed in America from the American Expeditionary Force during the week ended Nov. 1, was 586. The men were sent to Army hospitals where facilities for their physical reconstruction have been provided.

General Foch, in telegram to General Pershing, praises American Army activities. This, with other notes from France, is reproduced from the ARMY AND NAVY JOURNAL of November 7, 1918.

Commanders who led the United States Armies in France. Upper left, Lt. Gen. Hunter Liggett, USA, First Army; upper right, Lt. Gen. Robert L. Bullard, USA, Second Army; and, left, Maj. Gen. Joseph T. Dickman, USA, Third Army.

ately reduced casualties. In the war with Spain, twenty thousand men suffered from typhoid. In the World War, we had but two thousand cases. Reduced to percentages, it means that typhoid attacked twenty percent of our men in 1898-99 and one twentieth of one percent in 1917-18.

The lessons that the Army has learned in preventing typhoid fever within its own ranks, the whole medical profession has taken to heart. Inoculation against typhoid is commonly practiced. Time and again during national disasters, typhoid vaccine, developed in the Army, is rushed to the scene, civilians are inoculated and the dreaded disease is stopped before it makes headway.

In the Ohio River valley in 1937, for instance, the Army Medical School laboratory sent more than five hundred thousand doses of the typhoid vaccine to meet the urgent need.

It was the Army, too, that discovered that water, the source of many diseases, may be chlorinated, the germs killed and the taste still retained as palatable for the average drinker. Today, chlorination of water is practiced in all modern municipal water plants.

When the United States took over the administration of Puerto Rico, it was found that most of the population suffered from a disease then called tropical anemia. Army officers demonstrated that this disease came from hookworm infection. Steps were taken to wipe out its effects and today hookworm is under better control.

To the Army medical officers on duty in the Philippine Islands is due the discovery that polished rice is the cause of the tropical disease known as beri beri and now devastations from this dreaded malady have been permanently checked.

The Tropical Research Board, conducted in the Medical Department of the Army, has made contributions toward the treatment of amoebic dysentery, the prevention of malaria and other less known tropical diseases.

The Veterinary Corps of the Army has developed a vaccine against rinderpest which, prior to its discovery, had wiped out, in the tropics, herds of cattle and beasts of burden. The availability of this vaccine has practically eradicated this disease in the Philippine Islands.

Today, the country is awakening to the scourge of the social diseases. The havoc that they wrought in the armies of the world since the dawn of history was well known but the American Army was among the first to take steps to control it. In the war between the States, two hundred and fifteen soldiers per year were infected for every thousand members of a command. In the war with Spain, the rates were one hundred and seventy-five to one hundred and eighty per thousand. Upon the adoption of compulsory methods of prevention and treatment, the rates showed a sharp and progressive reduction in the Army and today they have dropped down to as low as 34.4 per one thousand of a command per year.

In France, the American Army established such a low record in social diseases that our allies were astonished. By education, by disciplinary measures and by prophylaxes, the Army has effectively reduced the spread of the disease within its own ranks.

While the Army has been conspicuous in the discoveries of preventive medicine, the Navy doctors have kept pace. In the Naval hospitals in the tropics, dispensaries were operated for the native population that needed care. There, Naval doctors made extensive researches and studied tropical medicine.

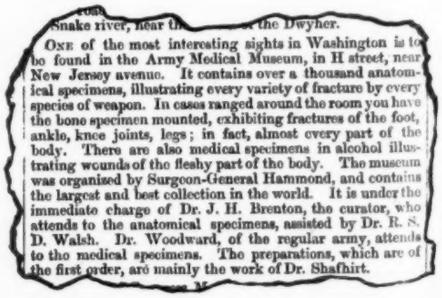
In Haiti, the American Navy converted the native city of Port Au Prince from one of the most dreaded cities of pestilence to a port of health and sanitation. Fighting ignorance, squalor and local revolutionary leaders, the Navy Department, and especially its doctors, moved forward to give the natives of Haiti sanitation, health and prolonged life.

In Samoa, medical officers of the Navy have had charge of sanitary and health conditions. During the years of American occupation, living conditions have markedly improved. About twenty years ago every Samoan was infested with hookworm. After years of patient teaching, the people of Samoa finally acquired a certain respect for sanitary laws. Today, hookworm disease is under complete control. Yaws, another disease common in Samoa, has been practically eradicated. Operations for elephantaisus, time and again have been successfully performed among the natives by expert Naval surgeons.

In Guam, the Navy conquered hookworm, yaws, gangosa and the deadly tetanus which killed more than one half of the newborn during the first month of their lives. The Navy discovered that midwives transmitted the tetanus and within one half year after their dismissal, the disease was conquered.

Guam is one of the few places in the world where venereal diseases are not allowed to exist. Their control is absolute. The crew of any training vessel that enters must undergo a thorough physical examination before receiving the liberty of the port.

The services may well look back to the last seventy-five years of medical progress in the Army and Navy and feel confident that the



Snake river, near th… the Dwyher.

ONE of the most interesting sights in Washington is to be found in the Army Medical Museum, in H street, near New Jersey avenue. It contains over a thousand anatomical specimens, illustrating every variety of fracture by every species of weapon. In cases ranged around the room you have the bone specimen mounted, exhibiting fractures of the foot, ankle, knee joints, legs; in fact, almost every part of the body. There are also medical specimens in alcohol illustrating wounds of the fleshy part of the body. The museum was organized by Surgeon-General Hammond, and contains the largest and best collection in the world. It is under the immediate charge of Dr. J. H. Brenton, the curator, who attends to the anatomical specimens, assisted by Dr. R. S. D. Walsh. Dr. Woodward, of the regular army, attends to the medical specimens. The preparations, which are of the first order, are mainly the work of Dr. Shafhirt.

The importance and value of the Army Medical Museum, was publicized in the ARMY AND NAVY JOURNAL of December 26, 1863, as reported above.

U. S. Steamship Galena (2d Rate),
Chios, Turkey, April 9, 1881.

Rear-Admiral J. C. Howell, U. S. N., Commanding Naval Forces on European Station:

Sir: I have the honor to report that near the hour designated in my letter of the 5th instant I left Constantinople for the purpose of assisting the sufferers from the destructive earthquake of the 3d inst. I arrived here on the morning of the 7th inst., having been delayed twelve hours on the way by an accident, the details of which I shall at an early day report to you. I at once called on the Governor, Sadyq Pasha, and offered such assistance as it was in my power to render. I found that the reports that I had received of the disaster had been exaggerated. The loss of life cannot at the present time be accurately computed, and the estimates vary all the way from 2,000 to 15,000, the latter being, of course, very much too great. In my opinion the number killed is probably about five thousand or six thousand. There were two destructive shocks, at an interval of a quarter of an hour, the first causing the greatest loss. After them and up to the present time there has been a succession of minor shocks, which, however, cause no further damage. Almost all the houses on the greater part of the island have been either thrown down or so shattered as to be uninhabitable. I am having an investigation made of the phenomena attending the catastrophe, and shall communicate the results to you in a detailed report. I have had parties ashore every day employed in extricating dead bodies, tearing down unsafe walls and bringing in wounded from the surrounding country. I have established a hospital tent ashore, and shall probably have to put up another to-day, as the twenty-two wounded which our men brought in yesterday completely filled up the space remaining in the first tent. There are still hundreds of people in the villages who have as yet received no medical attention whatever. I have seen no evidence of want of food among the people, the need in that respect having been amply supplied, but the want of medical care is extremely pressing. The natives here exhibit a most astonishing indifference to the sufferings of their own people, and we have had to compel them to aid in carrying the wounded. I have been very much pleased with the zeal exhibited by both the officers and men of this ship in all the work they have been required to perform since our arrival at this place. The following ships are at present in this port, viz.: The Turkish guardship from Smyrna, the French *Avisos, Bouvet*, and *Voltigeur*, the English gunboat *Bittern*, the English ambassador's yacht *Antelope*. The Austrian stationaire *Taurus* was here for several days, but left on Thursday. I shall remain here until the authorities have made provision for the care of the wounded I have collected and am still bringing in. I shall then proceed to Smyrna, take in a supply of coal, and await your further orders. I am, sir, very respectfully, your obedient servant,

Jas. O'Kane, Commander U. S. N., commanding.

The *Galena* is going to Salonica, Volo, and Athens, and will join the *Trenton* at Castellemaire.

Around the world, year in and year out, the services prove their peace time value in affording relief to stricken humanity. Above is reproduced from the Army and Navy Journal of May 14, 1881, the report of the Commander of the USS Galena which went to the Island of Chios following the earthquake there.

life of the average soldier, sailor and marine has been made healthier and happier and that preventive medicine not only in America but throughout the whole world has been enriched by the discoveries and the preventive steps taken by service doctors and administrators.

During the sporadic disasters that nature inflicted upon the human race in the last seventy-five years, both at home and abroad, mankind has found in our Army and our Navy veritable angels of mercy. Let us cite but a few examples.

In 1881 a disastrous earthquake desolated the Island of Chios in the Aegean Sea. Early on a mission of relief came a vessel of the United States Navy. It assisted in removing the dead and the wounded, in excavating ruins and in restoring order.

In 1902, when the Islands of Martinique and St. Vincent were afflicted with the volcanic eruption of Mount Pelee, Naval vessels in the Caribbean came to the rescue. When, five years later, an earthquake rocked Kingston, Jamaica, Naval doctors and Naval medical supplies were first to arrive in the city. In 1908, the Navy came to the rescue of Sicily. The American fleet happened to be in the Mediterranean cruising the world on a mission of good will and was able to give a true demonstration of its services to mankind. In 1923, the strife-torn burning city of Smyrna was saved by American naval forces again in the Mediterranean and during the same year, when earthquake, tidal wave, fire and their companions of famine and desolation were visiting Japan, on the other side of the world, American sailors again came to the rescue of an afflicted people. The same year a tidal wave across the west coast of South America brought American ships with food and clothing.

While the Navy's humanitarian efforts have extended primarily to foreign shores, our Army has been doing similar rescue work principally within our own shores.

The San Francisco fire, perennial floods along the Ohio and Mississippi, every grave civil emergency of the last seventy-five years, have found the Army at the call of distressed communities. It has rendered emergency service in harrowing disasters of plague and pestilence, earthquake, flood and fire. Such service, coupled with the saving of human life, cannot be measured in dollars and cents.

Instead of a complete chronicle of the humanitarian services of the Army since 1863, let us analyze its work during one of the most recent series of national disasters.

Early in 1937 the Ohio River valley was being inundated by the greatest flood in our history and the valley of the lower Mississippi was also threatened. Hundreds of thousands of human beings became homeless and the property damage mounted to many millions of dollars. While the flood waters were still rising, the Army was moving to the rescue. Cooperating with other branches of the government and with great relief agencies, the soldiers and employees of the War Department and other government workers sped ahead of the raging waters to save life, to feed, clothe, and shelter the unfortunates and to restore order to the stricken communities.

Army engineers directed one hundred and fifty thousand workers along the lower Mississippi, strengthening levees, guarding against breaks, and diverting mounting torrents to available floodways. Army doctors established emergency hospitals and directed the prevention of disease. Army aviators dropped needed food and precious medicines and serums to isolated communities. Army radiomen helped establish communication with cities and towns cut off from the outside world. And following this emergency, the facilities of the War Department in so far as possible were directed to help in the speedy reconstruction of the stricken area.

Whether working on joint relief expeditions or serving humanity alone, both the Army and the Navy have proved themselves the benefactors of mankind in time of great civil crisis.

for Soldiers at 62?

STEEL OR IRON FOR SHIPS.

It was intended that the House Committee on Naval Affairs should visit the Washington Navy-yard on Saturday last, for the purpose of witnessing some experiments on steel and iron, but, owing to the severe snow-storm which prevailed, only three of the members made their appearance. On Monday the Superintendent of Machinery of the Navy-yard appeared before the committee and explained the operations of Saturday. The superiority of steel to iron, and its preference for ship building, was fully illustrated. Mr. Park, of Park Bros. and Co., of Pittsburg, was also before the committee again. Mr. Henry D. Uniser, manager of the Lay Torpedo Co., of New York, was heard on the subject of torpedoes. Commanders Evans and Howison, U. S. N., were present, and submitted their views in relation to the material, etc., to be used for the new ships proposed.

On Tuesday, Engineer-in-Chief Shock, U. S. N., Messrs. Cramp, of Cramp and Sons, iron ship builders, and Messrs. Ashburnes, of the Cobalt Iron Works, were heard, and explained their views as to the best models and materials for the new ships, and also as to the present state of the manufacture of steel and iron adapted to ship building in this country.

So far, we have considered what the Army and the Navy have done in the last seventy-five years to protect life and to safeguard liberty. Now, let us examine some of their contributions toward the pursuit of greater happiness among our citizens. Let us see what they have done to build up American industry and to create jobs for American workers.

As a typical example, let us begin with the steel industry which owes its early development entirely to the aid and encouragement of our armed services and especially that of our Navy. Until the Navy definitely committed itself to steel ships, the steel industry in the United States hardly existed.

In 1861, the use of steel plates was first introduced in this country. They were used in making an experimental fire box for locomotives. 1865, a second fire box was made of this material. At that time, steel was produced only by the difficult crucible process and mass production was little considered. By 1880, some of the problems in connection with mak-

THE EFFICIENCY OF THE IRON-CLADS.

In response to a resolution of the House of Representatives, calling upon the Secretary of the Navy for the official reports, relating to the efficiency of the iron-clads, Mr. Welles has sent a formidable array of documents to that body. Among these are letters and reports from Rear-Admirals Dahlgren, Porter, Dupont, Goldsborough, Major-General Hunter and Brigadier-General Barnard, and correspondence between the Navy Department and its officers. These documents are classified under the headings of the different squadrons to whose operations they relate, those from the South Atlantic Squadron naturally taking the lead as being the most voluminous and important. The series includes an interesting correspondence between the Secretary of the Navy and Admiral Dupont, a portion of which exhibits a vigorous earnestness of style not altogether in keeping with the usual cool courtesy of official intercourse. The correspondence from the other squadrons we have not space to more than refer to this week. That from Admiral Porter especially exhibits a most decided faith in the capabilities of the Monitor type of vessels, one of which, as he does not hesitate to say, "could commence at Cairo, and going down the "river, could destroy every vessel we have on these "waters—unless they took advantage of their greater "speed and ran away." It is gratifying, in view of this, to learn, as we do, from the same report, that a formidable fleet of these vessels will soon be launched upon our Western waters.

In regard to the best system of iron-plating, Admiral Porter expresses the opinion, as the result of his observation, that "the resistance of iron depends "more on the wooden backing than on the thickness "of the iron; that is, two inches of iron and 36 "inches of oak will resist more than three inches of "iron and 15 inches of oak. I have moreover noticed that where there is a backing of wood covered with "three inches of iron, and that iron with wood again, "the resistance of the latter will prevent balls of "heavy size from entering the iron. In fact, it is "hardly indented." This opinion will be particularly gratifying to such enthusiastic advocates of the system of putting wood outside of the iron as Mr. Heaton, whose theoretical conclusions thus receive the endorsement of practical experience.

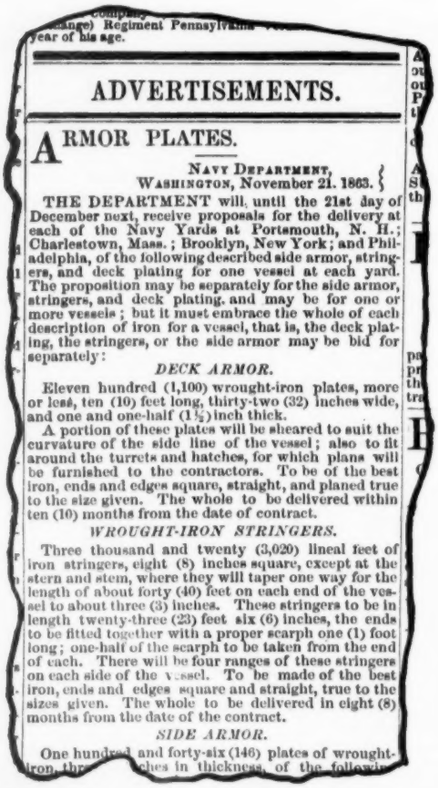
The Army and Navy Journal first saw the light of day at what was the beginning of probably the most interesting period in ship construction. Iron clads and monitors were taking their places in the fleet and discussion was great as to their merits. Above is reproduced an extract from the Army and Navy Journal of August 16, 1864. Left is an extract from the Army and Navy Journal of February 11, 1882, when the Navy was attempting to arouse Congress and the country to action in the matter of steel vessels.

ing steel plates had been solved and they came into more common use in the manufacture not only of locomotive fire boxes but also of bridges, approaches and roadway girders. Here and there an enterprising ship builder had constructed a vessel of steel but such ships were regarded more or less as oddities. Production of steel for many purposes still was so uncertain that manufacturers would not accept orders of material to conform to specifications. The purchaser had to depend for quality solely on the reputation of the manufacturer.

The revolution of steel production in the United States dates from 1881 when the Secretary of the Navy appointed a board for the purpose of recommending construction of new vessels. It made an exhaustive report and recommended not only that new ships be constructed of steel but specified its grade and quality. As a result, Congress authorized the Navy to build four steel vessels but insisted that the work be done in domestic mills. This event marks the beginning both of the modern Navy and of the manufacture of steel as an American industry.

At first, no American manufacturer was willing to accept a contract to deliver steel in accordance with the Navy's rigid specifications. After some persuasion, one bold industrialist accepted the challenge. Soon others followed. In 1883, contracts for the building of four steel ships were properly drawn up and signed.

The mills, however, experienced such enormous difficulties in trying to produce a steel to conform with the Navy's specifications that they brought great pressure to bear on the service to modify its requirements. Their efforts failed. The Navy had greater faith in the industry than its own members had in themselves. The Navy believed that America could produce a superior type of steel and refused to compromise.



...ange) Regiment Pennsylvania ...
year of his age.

ADVERTISEMENTS.

ARMOR PLATES.

NAVY DEPARTMENT,
WASHINGTON, November 21. 1863.

THE DEPARTMENT will, until the 21st day of December next, receive proposals for the delivery at each of the Navy Yards at Portsmouth, N. H.; Charlestown, Mass.; Brooklyn, New York; and Philadelphia, of the following described side armor, stringers, and deck plating for one vessel at each yard. The proposition may be separately for the side armor, stringers, and deck plating, and may be for one or more vessels; but it must embrace the whole of each description of iron for a vessel, that is, the deck plating, the stringers, or the side armor may be bid for separately:

DECK ARMOR.

Eleven hundred (1,100) wrought-iron plates, more or less, ten (10) feet long, thirty-two (32) inches wide, and one and one-half (1½) inch thick.

A portion of these plates will be sheared to suit the curvature of the side line of the vessel; also to fit around the turrets and hatches, for which plans will be furnished to the contractors. To be of the best iron, ends and edges square, straight, and planed true to the size given. The whole to be delivered within ten (10) months from the date of contract.

WROUGHT-IRON STRINGERS.

Three thousand and twenty (3,020) lineal feet of iron stringers, eight (8) inches square, except at the stern and stem, where they will taper one way for the length of about forty (40) feet on each end of the vessel to about three (3) inches. These stringers to be in length twenty-three (23) feet six (6) inches, the ends to be fitted together with a proper scarph one (1) foot long; one-half of the scarph to be taken from the end of each. There will be four ranges of these stringers on each side of the vessel. To be made of the best iron, ends and edges square and straight, true to the sizes given. The whole to be delivered in eight (8) months from the date of the contract.

SIDE ARMOR.

One hundred and forty-six (146) plates of wrought-iron, thr... inches in thickness, of the followi...

The Navy Department advertises, in the ARMY AND NAVY JOURNAL of November 28, 1863, for Armor plates for its iron-clads.

So had the Navy's requirements. Finally, they did produce a material which came up to specifications. American industry had met the Navy's challenge. It had learned how to make good steel.

Encouraged by this success, the industry was ready to move forward. From that time on there never has been any question about the ability of the United States to produce steel as good as any manufactured abroad.

One of the most difficult and expensive problems encountered in 1883 in the construction of the first ships of the new steel Navy was in the building of the steel frame. Someone in the Navy had the idea that a frame made of cast steel would answer its needs. The steel casting industry, however, was scarcely even in its infancy. Cast steel was used only in the manufacture of very small parts of machinery. Few members of the engineering profession had any faith in the material.

An official of the Navy, therefore, was detailed to investigate the possibilities. His studies strengthened his views that cast steel beams would prove not only practicable but even less expensive. No steel foundry at that time had either melting capacity or annealing ovens of sufficient size to handle such large castings. As always, the Navy found an enterprising and patriotic foundry willing to stake its reputation on a service need.

In 1887, the first satisfactory casting of steel for the building of frames was completed. It weighed 6,720 pounds. Thus began the cast steel industry of America.

What the Navy insisted upon and what the steel industry undertook to produce soon accrued to the advantage of the American railroads. Following the lead of the Navy, they gradually swung around to the use of steel casting for locomotive frames and for other structural parts. There is no doubt that the remarkable development of railroad locomotives and rolling stock in the United States can be traced in a great measure to these humble beginnings.

By its early example, the Navy had stimulated and encouraged the steel casting industry and the latter in turn had influenced the use of such castings by the railroads. With two such customers as the United States Navy and the American railroads, the prospects for the steel industry, indeed, were bright.

The history of the evolution of steel forging is a variation of the same story, which emphasizes again the Navy's contribution to the development of the industry. Out of the improvement in range and hitting power of heavy guns came the necessity for some sort of defense. The Navy demanded armored plate. It was not manufactured in America. All our heavy forgings had come from abroad. In 1883, therefore, the Navy sent a gun foundry board to Europe to visit iron and steel production plants. As a result of their association with European manufacturers, a plant was established in Bethlehem, Pennsylvania, known as the Bethlehem Iron Company.

In 1887, the United States Government placed its first contract for armor for the Navy with this American concern. Expanded greatly, it is now the Bethlehem Steel Corporation, the variety of whose products for commercial purposes is too well known for enumeration and the wide scope of whose demands for labor control the pay roll barometer for the American workingman.

The Army, too, has played an important role in the growth and development of the steel industry. It was the Army which was the original market for steel products. High grade steel dates from the Civil War when the Army created the demand for a superior grade of metal. In 1880, the Army's requirements for high carbon steel for use in guns were fully fifty per cent more severe than those for general industrial specifications. Later, it was the Army Ordnance Department that introduced alloy steel and prescribed the use of nickel steel at a time when there were practically no other demands for such grade in the entire country and when only two or three commercial companies were capable of their manufacture.

In 1875, the Army established at the Watertown Arsenal the largest metal testing machine in the world. Here pioneer work has been performed which has had a tremendous influence in stimulating similar research and investigation on the part of technical experts throughout the country. In the last seventy-five years the services, indeed, have proved themselves laboratory guides of study and research which industrial plants and educational institutions have followed.

AS another example of the contributions of the services to industry, let us consider what the Navy has done for shipbuilding. Before the Navy stepped in to correct the situation, there were very few men in America who had any theoretical knowledge of naval architecture. In his report of 1882, the Secretary of the Navy describes the delay and difficulty he experienced in finding for appointment on a board even two persons from civil life of established reputation and standing who could serve as experts in naval or maritime construction. The Navy itself at that time had no officers who had been educated in theoretical naval architecture. There was little time for its study at the United States Naval Academy. The subject had not been taught at any of our universities.

With characteristic foresight, the Navy, in 1879, had sent two officers to the Royal Naval College at Greenwich for a course of instruction in shipbuilding. Their assignment marks the beginning of naval architecture in the United States. Every year thereafter for the next twenty years, one to five officers were selected from the graduating class of the Naval Academy and were sent abroad for such post graduate instruction. They attended school not only in Greenwich but also in Glasgow and Paris. In 1901, the Massachusetts Institute of Technology offered a course of instruction for naval constructors which filled a need that hitherto had been lacking in the United States, the impetus for whose establishment came directly from the Navy.

Under the influence of these especially educated officers, members of the Construction Corps of the United States Navy, many of whom later had left the service to enter shipyards, the shipbuilding industry of the United

States has been developed. They are represented in the management of practically all the important shipbuilding plants of the country. Without them, the shipbuilding industry of the United States would not have been able to respond to the tremendous demands that have been made upon it, especially during the World War.

As inspectors for the government at shipbuilding plants, where vessels have been built for the Navy, members of the Construction Corps have been of considerable help to the industry in establishing scientific and standardized methods of design and construction. Their efforts have been perhaps as great a contribution to shipbuilding in the United States as the work of the directors of the industry themselves.

TO take a more recent example of the contributions of the services to industry, let us see what the Army and Navy have done for aviation. Needless to say, if it had not been for the services the aeronautical industry as it exists today could not have been made possible. From the time of the first flights, the Army and Navy have taken an interest in aviation and have encouraged its development. Until the World War, aviation was but in its experimental stage. Until 1914, the aviation industry in America consisted of very few firms and individuals who were designing and constructing airplanes. The number employed scarcely warranted for aviation the status of an industry.

At the outbreak of the World War, aviation received a tremendous stimulus. Leaders of European armies placed great military value on the proper use of the plane in the final outcome of battle. Demands of the Allies for aviation material multiplied. The industry experienced its first expansion.

On our entrance in the World War in 1917, the demand for planes jumped the most reasonable bounds. The call naturally was entirely for military planes. Commercial aviation as such still was non-existant.

After the War, came the doldrum years of aviation. The feverish demands for planes stopped with the Armistice. A surplus of ships hung over from the World War. Appropriations for new planes lagged. The newly developed industry fell into a tail spin.

Officers of the Army and Navy, however, did all in their power to keep the aviation industry alive. They realized the importance of superiority in the air to achieving victory in battle. They concentrated on experiment and development. They felt also that commercial aviation would spur industry to reach greater heights. They found that the greatest single problem of that day was focused upon the development of airplane engines which could satisfy both civilian and military needs.

Contracts of the Army and Navy, small as they were, helped to bring out more efficient types of engines by the aviation industry.

The services, and especially the Navy, were seeking an air-cooled engine of few parts, one that was free from the need of any delicate radiator system. The answer came in 1922 with the air-cooled engine, the J-1. This was developed for the Navy. It showed a marked improvement over previous designs. It appeared to meet not only the demands of the service but the needs of commercial aviation. Subsequent models kept improving the original type.

Out of these beginnings was evolved the present type of aeronautical air-cooled engine. Today, it has become world famous. It was the type which Lindbergh, Chamberlain and Byrd flew across the Atlantic.

The development of the air-cooled engine, it is generally agreed, could not have taken place except for the assistance of the Navy Department. Its purchases were veritable manna to a young and struggling industry. Its support and encouragement kept up the morale of engineers and designers when there was no demand for their commercial services. Its expert fliers and its skilled mechanics gave freely of their advice and experience and many of the improvements that have taken place in airplane engine construction are traceable to this help and guidance.

To the Navy also belongs the credit for inventing the catapult, a mechanical device for launching planes from ships.

The Navy built the first modern wind tunnel in the United States, which provides the means for finding the engineering basis for the design of naval aircraft. The information which the Navy has accumulated at this wind tunnel, which is located at the Washington Navy Yard, has been of inestimable value to aeroplane manufacturers. The continual search for the best in engines, in design and in accessories, under the direction of the Bureau of Aeronautics of the Navy Department, has given to manufacturers the benefit of the best and the most exhaustive research.

Let us now cite a few of the contributions of the Army Air Corps to the development of the aviation industry.

Modern transport planes, with their present tremendous speeds, owe their performance virtually to four things; first, one-thousand horsepower, lightweight engines; second, metal, low wing monocoque construction; third, retractable landing gears, and, finally, adjustable pitch and constant speed metal propellers. Every one of these inventions, discoveries or improvements is directly traceable in its initial inception and original trials to the Army Air Corps experimental engineering division at Wright Field, Ohio.

Not only in the experimental field has the Army led the way of America to the present air pinnacle. It early realized that one of the essential components of any air force is a group of competent pilots. It, therefore, established at San Antonio, Texas, the Air Corps Training Center, known as the "West Point of the Air," which is recognized the world over as a model for aviation pilot training. Here, again, not only have Army fliers been trained but the Army generously trained a surplus of men who have gone forth to pilot the civil airlines. That the civil airlines were quick to profit from this reserve of trained fliers, is attested by the fact that more than fifty per cent of the pilots who are flying great commercial planes today are Army trained. Navy trained fliers, too, are conspicuous among commercial pilots.

Military leaders recognized from the beginning that if aviation were to grow, there must be created a public interest in it. The Army Air Corps began in the early days to create and stimulate this interest. The first flight around the world by Army pilots in Army planes; the first trans-continental non-stop flight across the United States by Army pilots in Army planes; and the first flight across the continent in the daylight of one day, are examples of the methods that the Army employed to keep America awake to the future of aviation.

The Army Air Corps flew the first air mail and transferred to the Post Office Department the planes and pilots to continue the development of that system. It drew up maps, laid out and flew the first model airways, designed and installed the first radio beacon and developed blind landing apparatus. Army pilots made the first instrument landings, indicating the feasibility of defeating fog and heavy weather. That this experimentation and progress under the Army is still under way is evidenced by the fact that only recently Army Air Corps officers and engineers at Wright Field demonstrated a new apparatus and system whereby planes can be landed automatically without the aid of human hands. This innovation is regarded in aviation circles as the most significant step

AERONAUTICAL NOTES.

The aeroplane contract between the Wrights and the War Department provided that for every mile over forty an hour there should be a bonus of $2,500 up to forty-four miles an hour, and as in the ten-mile speed test of July 30 an average of 42.583 miles was made, the price to be paid the aeroplanists for their machine will be $30,000, which represents a bonus of $5,000. The contract including a provision for the instruction of two Army officers by the Wrights, Lieut. Frank P. Lahm, who rode with Orville Wright on the one hour endurance test, and Lieut. Benjamin D. Foulois, who went to Alexandria and back with the aviator on July 30, have been selected as the officers who will be instructed. The instructions will not be at Fort Myer, but some other place around Washington, where there is more room. According to the official figures made public by the Aeronautical Board of the War Department the aeroplane made the five miles from Fort Myer to Shooters Hill, in Alexandria, at the rate of 37.735 miles an hour. The return trip was made at the rate of 47.431 miles an hour, so his average was 42.583 miles an hour. Had he not been carried slightly out of his course Wright would probably have made forty-three miles an hour and earned $2,500 more.

The War Department has announced that no more time will be given A. M. Herring, the aeroplane inventor, for the delivery of a machine for government trial. Mr. Herring was to have brought his machine to Washington many months ago, but has not done so. Several extensions of time have been granted him, the last of which expired July 31. He informed the government that he could not get the machine to Fort Myer before Sept. 1. Consequently General Allen, Chief Signal Officer, has decided that it is inadvisable to grant the inventor more time.

Roger Sommer at Paris, Aug. 2, flew in a biplane nine miles straightaway in twelve minutes. This is a rate of forty-five miles an hour. Orville Wright made only 42.5 at his speed trial the other day in Washington, but he kept it up on the average for an hour.

The British War Secretary Haldane says that England will spend $390,000 the coming year in military aeronautical work.

At the Petewawa military camp, 100 miles west of Ottawa, on Aug. 2, the Silver Dart aerodrome made four successful flights of about half a mile each, the Canadian machine carrying, for the first time, a passenger in addition to the operator. There was no wind and the aerodrome rose gracefully into the air, attaining a speed of over forty miles. On landing the fourth time the sun rising over the hills shone in the aviator's eyes and as they were landing the aerodrome struck the knoll a little short of the crest, ricochetting and striking again. The wings and control were wrecked, but the motor remained uninjured.

Answering a supposed "conservative" faction in the Army which seems to regard the money spent on aeroplanes as wasted except as it may serve to encourage the inventors, and who says, "If it took the Wrights five weeks, to find fit weather for a trial, what good would it be in actual war?" the Springfield Republican says: "This is a very narrow view, for the reason that in war the weather is as bad for one side as for the other. If storms make airship scouting impossible both sides are on even terms; if the wind falls even for an hour the side best equipped for flying may gain a decisive advantage from a knowledge of how the hostile forces are disposed. An airship cruise before Gettysburg or during Chancellorsville would have made a prodigious difference in history. It will not be long before the flying machine, with a corps of trained aviators, will take part in all general maneuvers, not displacing the cavalry, but supplementing it. In good weather and over bad roads the airship may do in an hour what cavalry could not do in a day, just as in stormy weather cavalry can do slowly and tollfully what the airship could not do at all."

The history of motor powered flight in heavier-than-air craft, begun by the Wright brothers in 1903 and adapted to military uses by the United States Army in 1909, may be traced through the columns of the ARMY AND NAVY JOURNAL, from the August 7, 1909 issue of which is reproduced the above interesting excerpt.

toward eliminating the flight hazards incident to zero visibility.

IN radio, too, the services are responsible for the establishment and the growth of a great industry. In the preparation of rigid and far-seeing specifications, in the purchase of equipment when there was no market for such appliances, the Army and Navy played an important role in the development of radio.

Before the World War, a large part of the commercial radio traffic in the United States and across the oceans was being handled by companies, a considerable portion of whose stock was foreign-owned. Before 1917, Germany and Great Britain practically monopolized our radio business. German stations in the United States embarrassed our government in its efforts to maintain neutrality. Before we entered on the side of the Allies, the British government was employing measures of value primarily to itself without regard for our needs.

The Navy took over the German stations in 1917 and later entered into negotiations for the purchase of the British interests in the United States and the Hawaiian Islands.

Out of these operations, a new and vigorous interest in radio was created. As a result of conferences sponsored by the Navy Department, the Radio Corporation of America was established in 1919, thus assuring the United States a company which was one hundred per cent American.

The Navy has had a tremendous effect on radio design. To meet its requirements, manufacturers have had to experiment and develop many different bits of radio equipment. The old spark radio transmitting sets which twenty-five years ago cost from $1,800 to $7,000 apiece, became commercially available for as low as $700 as a result of the impetus given to its production in greater numbers by the Navy.

Later, the continuous wave arc radio supplanted the spark set as a result of the Navy's improvements and encouragement. The fostering by the Navy of arc transmitters not only reduced the price of this equipment but increased the efficiency of ship transmission. It enabled commercial ships to keep in constant communication with shore stations.

In the development of the vacuum tube, the Navy was first among its purchasers and from the outset gave every encouragement to its development. The Navy called together manufacturers, gave orders for the equipment and urged the various companies to do advanced research work. When it is realized that the vacuum tube is used primarily throughout the country today for receiving purposes by all the amateurs, commercial and governmental departments, and that the tube today costs two-thirds less and has ten times the life of the tube originally furnished the services, the value of the Navy's fostering this type of equipment can be readily appreciated.

To turn to the contributions of the Army toward the radio industry, let it be noted first that the Army has the credit for establishing the first public commercial radio service on the American continent. In 1899, it had instituted regular public radio communications between Fire Island and the Fire Island Lightship, a distance of twelve miles.

The present Alaska communications system, consisting almost entirely of point to point radio circuits, was installed and is maintained and operated by the Signal Corps of the United States Army for non-military purposes. It is the only electrical communication system existing at present in Alaska.

No mention of the Signal Corps' contribution of the last seventy-five years is complete without reference to the remarkable inventions developed in its laboratories. Among them are the loop which superseded the cumbersome outside antenna. Major General Squier's remarkable application of radio principles to the commercial telephone system, which made possible the administering of existing wire lines for sending private messages and broadcasting, is perhaps the most notable.

The Signal Corps of the Army shares with the Navy the credit for the introduction of the vacuum tube in this country and for the development of the small radio set which is now in such general use by radio amateurs.

THE Signal Corps organized the United States Weather Bureau and during the Army's control it gave out information of tremendous interest to the entire scientific world. No achievement in the history of the Army is more creditable and hardly any of its peacetime accomplishments strike the average citizen as more useful. Today, we have a well organized system of predicting storms, fair weather or snow fall. Much of our daily activity is governed by our ability to forecast the weather. The progress and development of air transportation of today would have been impossible without weather forecasting. The Weather Bureau has been taken out of the jurisdiction of the Army but the ideals of service and the scientific principles laid down by its military personnel during the early history constitute the foundations upon which this organization works today.

The work of the Navy's Weather Bureau as a phase of the activities of its communications service has proved a blessing to all mariners. Weather forecasts and storm warnings are furnished by practically all coastal naval radio stations upon prearranged schedules and designated frequencies or immediately upon receipt in the case of important hurricane warnings. Mariners are apprised of the location of storms and the conditions which they may expect to find along the coast and at their destination. Through the naval communication service, the Weather Bureau's sources of information have been extended to include data from the Philippine Islands, Alaska, the Panama Canal Zone, the West Indies, Guam and the Hawaiian Islands.

Although the Navy's weather broadcasts were begun for the exclusive benefit of the mariner, farmers all over the country have learned to pick up the forecasts through local amateurs and take warning concerning approaching storms, droughts and rains.

This important service to shipping is aided by the naval radio compass stations. They are sprinkled along both of our coasts with the necessary apparatus that enables them to determine very accurately the direction of a transmitting vessel. Storms frequently drive a mariner off his course and

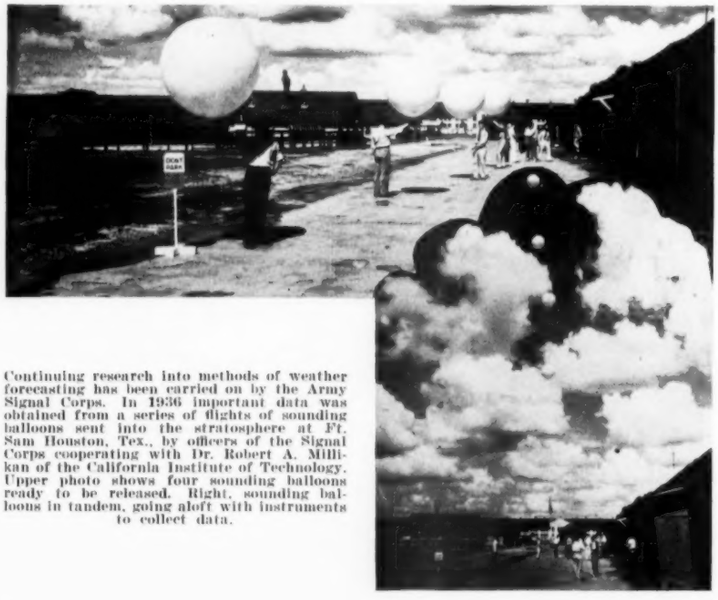
THE MARCONI SYSTEM.

Col. James Allen, of the Signal Corps of the Army, has planned to conduct an extensive series of experiments in Washington this fall with the Marconi system of wireless telegraphy. The tests are to be conducted in connection with the new automobiles recently received by the War Department. The automobile Signal Corps wagons are to be supplied with the electric appliances of the Marconi system, and each of the storage wagons will, in addition, be provided with a balloon which will carry into the air the coil of electric wire necessary for the transmission of the messages. One principle of the wireless telegraphy discovery is the elevation of the conducting wire into the air. The instrument is attached to the ground end of the wire, but there is no connecting wire between the different points of communication. Around the hills of Arlington and Fort Myer the country affords excellent experimental ground. It is proposed to have one automobile wagon go into the field several miles from the fort and then send into the air a balloon with the electric wire attached. From this wagon to the other wagon it is proposed to send the messages by the wireless system. The automobile wagons received by the War Department are three in number and were constructed expressly under the specifications prepared by Col. Allen. Two wagons are shaped like a regular covered delivery wagon and are designed to carry the Signal Corps' various instruments and paraphernalia, and one wagon is without cover and designed for the conveyance of officers of the Corps.

The equipment of the first mentioned wagons consists of forty cells of storage battery of sufficient capacity to run these vehicles thirty miles on one charge of the batteries carrying 1,500 pounds transportation load. The motor equipment consists of two 3½ horse power motors, one attached directly and independently to either rear wheel, and are so wound and designed that they can be worked on grades and bad roads to as high as 6 horse power each, which would mean a maximum horse power capacity of 12 horse power for each wagon.

The maximum speed of the vehicles is ten miles an hour. A novel feature of these wagons is the absence of anything like bicycle construction, or what is commonly expected in automobile construction. Every piece of iron work in the vehicle was hand forged, and the wheels are made with steel hubs, the inside of which form receptacles for the ball bearings. Instead of pneumatic tires the wheels are bound with solid hard rubber tires. They are fitted up with electric lights in the side lanterns and in the larger vehicles in the interior also, and it is understood that later a new form of searchlight will be added to the equipment. The larger wagons are designed for any use that may be required in the signal service, and can be readily converted into a field telegraph station should the occasion require it.

The services' early use of scientific and industrial developments is evident in the above extract from the ARMY AND NAVY JOURNAL of October 14, 1899, wherein is reported progress in the use of the radio, automobile, electric motors and electric lights.



Continuing research into methods of weather forecasting has been carried on by the Army Signal Corps. In 1936 important data was obtained from a series of flights of sounding balloons sent into the stratosphere at Ft. Sam Houston, Tex., by officers of the Signal Corps cooperating with Dr. Robert A. Millikan of the California Institute of Technology. Upper photo shows four sounding balloons ready to be released. Right, sounding balloons in tandem, going aloft with instruments to collect data.

during succeeding periods of cloudy and overcast weather he is deprived of the benefit of astronomical observation. Under these circumstances, except for the radio compass stations he could only guess at his position, and he may be as much as fifty or one hundred miles in error. A compass, however, can inform him of his position within a few miles, depending upon his distance from shore. Many a shipwreck has thus been prevented by the timely information furnished by the Navy.

Certain of our harbors, notably New York, are frequently fogbound. The uncertainty of the mariner's position who is approaching from the sea is removed by the accurate information he receives from the compass station. In practice, the great trans-Atlantic liners never enter New York harbor in other than clear weather without availing themselves of the aids of the naval radio compass station. This service, our Navy gives ships of the entire world free of charge.

WHAT the Navy has done for marine engineering, in developing the proper metals to be used, in ship construction, in improving boilers, in experiments in Diesel engines and storage batteries, in creating distilling and refrigerating plants, is worthy, in itself, of an article of book proportions.

What the Navy has contributed to human knowledge through its innumerable exploring and surveying voyages would require a similar tome. Their mere compilation for the preceding century covered twenty printed pages in the Annual Report of the Secretary of the Navy for 1924.

In the last seventy-five years, there have been several noteworthy expeditions to Central America, to determine the most feasible route for joining the Atlantic and Pacific Oceans. There was the Darien expedition, which surveyed and examined the Tehuantepec, Honduras, Chiriqui and Panama routes. There was the research of the Nicaragua Canal Commission. The information furnished by these expeditions added considerable data on the basis of which the most accessible route for the canal finally was determined.

The frozen wastes of the Polar regions always have attracted the American sons of the sea. It was a naval officer, Admiral Peary, who was first to reach the north pole, the goal of all ages of exploration. It was a naval officer, Rear Admiral Byrd, who made the first successful airplane flight over either pole. The full fruits of Byrd's conquest of Antartica, a vast continent larger than the United States, though still unknown, later generations richly may harvest.

Between 1874 and 1884, the United States Navy determined the longitude telegraphically of thirty places and thus formed a girdle of accurately determined positions, secondary meridians, around the entire globe.

Before the development of the sonic depth finder, the United States Navy ran seven trans-Pacific, fourteen trans-Atlantic and about nine inter-continental lines of deep sea soundings with the lead mainly for the purpose of laying cables. Today, with the perfection and installation on naval vessels of the sonic depth finder, an added incentive to scientific research of marine depths has been provided.

In its discoveries, explorations, surveys and expeditions, the Navy indeed has increased the human knowledge of the world and has helped harness nature to man's needs.

What, on the other hand, the Corps of Engineers of the United States Army has done in the construction and maintenance of roads, wharves, bridges and railroads, and in the improvement of rivers and harbors and in the installation of structures related to flood control, similarly is worthy of a treatise of its own.

There are other services almost without number that the Army and Navy still perform which add to the blessings of peace. There is the Hydrographic Office of the Navy with its aids to safe navigation of the seas and the air.

Established in 1866, as an independent institution, separate from its parent organization, the Naval Observatory, it has developed charts and sailing directions; it has studied ocean currents; it has surveyed the surface and depths of the sea; it has maintained an international ice patrol. All of these services have contributed toward the conquest of the perils of the sea and the air.

The work started by Lieutenant Matthew Fontaine Maury, who issued his famous wind and current charts from 1844 to 1861, showing feeding grounds of whales, track, trade wind, storm, rain and temperature charts, has been tremendously expanded into a military and naval asset to national defense and a vital factor in the development of the Merchant Marine and aviation.

It was this same Maury, incidentally, who after joining the Confederacy in the war between the States, invented the electric torpedo for harbor defense. Out of these beginnings grew several varieties of torpedo—floating, anchor, mechanical and electrical—which harrassed the Federal Navy and which, after 1865, became valuable assets to the fleet of a united nation.

To the Naval Observatory in Washington, men of the sea, military and civilian, daily look with confidence for aids to navigation. The Observatory computes and prepares for publication the American Ephemeris and Nautical Almanac. It develops, supplies, keeps up and inspects all navigational instruments—gyro and magnetic compasses, chronometers, clocks, watches, sextants, sounding apparatus, spy glasses, binoculars

NAVY GAZETTE.

HYDROGRAPHIC OFFICE IN THE NAVY DEPARTMENT.

[PUBLIC—No. 77.]

AN ACT to establish a Hydrographic Office in the Navy Department.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That there shall be a Hydrographic Office attached to the Bureau of Navigation in the Navy Department, for the improvement of the means for navigating safely the vessels of the Navy and of the mercantile marine, by providing, under the authority of the Secretary of the Navy, accurate and cheap nautical charts, sailing directions, navigators, and manuals of instructions, for the use of all vessels of the United States, and for the benefit and use of navigators generally.

SEC. 2. *And be it further enacted*, That the Secretary of the Navy be, and he is hereby authorized to cause to be prepared, at the Hydrographic Office attached to the Bureau of Navigation in the Navy Department, maps, charts, and nautical books relating to and required in navigation, and to publish and furnish them to navigators at the cost of printing and paper, and to purchase the plates and copyrights of such existing maps, charts, navigators, sailing directions and instructions, as he may consider necessary, and when he may deem it expedient to do so, and under such rules, regulations, and instructions as he may prescribe.

SEC. 3. *And be it further enacted*, That the moneys which may be received from the sale of all such maps, charts, and nautical books shall be returned by the Secretary of the Navy in the Treasury of the United States, to be used in the further preparation and publication of maps, charts, navigators, sailing directions and instructions for the use of seamen, and to be sold at the rates as set forth in the preceding section.

Approved, June 21 1866.

APPOINTMENTS TO THE MILITARY

The Hydrographic Office is established. From the ARMY AND NAVY JOURNAL of June 30, 1866.

PEARY REACHES THE NORTH POLE.

Quickly following Dr. Frederick A. Cook's statement that he had found the North Pole on April 21, 1908, came a number of despatches from Civil Engr. Robert E. Peary, U.S.N., announcing that he had reached the pole on April 6, 1909. The first of these despatches was sent to the press of New York city, under date of Indian Harbor, via Cape Ray, N.F., Sept. 6, and was worded as follows:

"Stars and Stripes nailed to the North Pole. Peary."

On Sept. 8, the explorer having been advised of Cook's claims, this despatch was sent to the New York Times from Indian Harbor:

"Cook's story should not be taken too seriously. The Eskimos who accompanied him say that he went no distance North. He did not get out of sight of land. Other men of the tribe corroborate their statements. Kindly give this to all home and foreign news associations for the same wide distribution as Cook's story. Peary."

To Mrs. Peary, on the same day, the explorer telegraphed as follows:

"Don't let Cook story worry you. Have him nailed. Bert."

The steamer Roosevelt and all the members of the expedition returned in safety, with the exception of Prof. Ross G. Marvin, of Cornell University, who was drowned on April 10, forty-five miles north of Cape Columbia, while leading the supporting party. Later information from Peary gave this chronology of the expedition: The Roosevelt, which sailed from New York on July 6, 1908, left Sydney on July 17; arrived at Cape York, Greenland, Aug. 1; left Etah, Greenland, Aug. 8; arrived at Cape Sheridan, Grantland, Sept. 1; wintered at Cape Sheridan; sledge expedition in dash for the pole left the Roosevelt at Cape Sheridan on Feb. 15, 1909, arrived at Cape Columbia March 1, passed British record March 2, crossed the eighty-fourth parallel March 11, the eighty-fifth March 18 and eighty-sixth on March 22, passed Norwegian record March 23, passed Italian record March 24, crossed eighty-seventh parallel March 27, passed American record March 28, crossed eighty-eighth parallel April 2 and eighty-ninth April 4 and reached the pole April 6. The departure from the pole was made the next day and Cape Columbia was reached April 23, the party arriving on board the Roosevelt April 27. The Roosevelt left Cape Sheridan July 18 and left Cape York Aug. 26. The journey to the pole from Cape Columbia was made in thirty-seven days and return occupied sixteen days. To understand the meaning of the references to records it may be explained that the British record, made by Nares, was 83 degrees 23 minutes; the Norwegian record, made by Nansen, 86 degrees 5 minutes; the Italian record, made by Cagni, 86 degrees 34 minutes, and the American record, made by Peary, 87 degrees 6 minutes. It will be seen that Peary held the highest record.

The news of the success of the Peary expedition reached Copenhagen in the midst of the round of honors showered upon Dr. Cook by Danish scientists and royalty in spite of the incredulity with which many of the leading geographers of Europe had received the announcement of the doctor's discovery. Immediately there began a controversy as to whether Dr. Cook had reached the pole. When the news of the success of Peary was conveyed to Dr. Cook in Copenhagen he replied: "If Commander Peary says he has been to the pole I believe him." He declined to enter into any controversy with Peary, and asserted that in due time he would prove his [illegible] observations that he

News of the return of the successful Peary Polar expedition, reproduced from the ARMY AND NAVY JOURNAL of September 11, 1909.

—for the Navy's surface, submarine and air craft. It establishes the standards for the navigational instruments of the growing Merchant Marine of the country. By radio and telegraph it daily furnishes and transmits time. It cooperates with scientific institutions in the studies of the heavens and its contributions to astronomy are fully recognized among learned societies.

There is the Chemical Warfare Service of the Army with its rodent and insect destroying gases that help the ship operator to free his vessel from Vermin and the farmer to rid his land of the dreaded boll weevil. Speaking of the farmer, we must not overlook the contributions of the Army Remount Service which has effected virtual wonders in improving the breed of the American farm horse.

Of the most recent contributions of the services toward the well-being of America, the Civilian Conservation Corps camps have attracted the greatest attention and have brought forth unequivocal commendation. Called upon without previous notice to mobilize, equip, house, pay and clothe three hundred thousand unemployed young civilians, a force greater than was mustered into the military service during the entire war with Spain, the Army went about this work quietly and efficiently. The proven ability of the machinery of the Army to handle and care for large projects and men was recognized by the nation in need and immediately put to use. With the aid of the officers of the Navy, Marine Corps, Coast Guard, and of the Army

Reserve Corps the Regular Army started the Civilian Conservation Corps auspiciously.

Up to June 30, 1938, the Army had enrolled approximately two and one half million men, constructed more than two thousand work camps, paid the enrollees and handled their allotments, purchased and inspected their needed supplies and equipment. The administration of the Civilian Conservation Corps is generally regarded as the outstanding contribution of the American government of the last five years toward the conservation of American youth and the preservation of America's natural resources.

In making useful citizens out of the youth of America, the services have been of inestimable value in the last seventy-five years. The Army and Navy depend upon American youth for their personnel. They do not look to any special group or military class for recruits. They do not solicit men who already have found their place in society. They ask merely for good character and dependability and promise to return at the end of an enlistment healthy and intelligent men who will aspire to better things in life and who will prove assets to their country in war and peace.

Our officers and our enlisted men are the sons of farmers, laborers, merchants and professional men. A more ideal field for splendid fighting material no nation in the world possesses. Compare the galaxy of bright stars that have shone in the military firmament in the last seventy-five years, and where will you find their equal—Grant, Lee, Sheridan, Jackson, Sherman, Pershing, Harbord and Goethals, Farragut, Dahlgren, Dewey, Sampson, Mahan and Simms?

Few of the enlisted men who enter the Army and Navy have yet had time to adjust themselves in industry or business, yet practically none of them returns home after the completion of an enlistment without a knowledge and proficiency in some work that may assist him in acclimating himself to the economic life of his community and of helping him contribute to its normal and healthy life. They come into the Army as young farmer boys, unskilled laborers, jobless and often rather pessimistic about their future. They return to their homes trained for some job, equipped with broader vision and education, capable of carrying on the duties and responsibilities of citizenship in our country.

The officers of the services have given the world an example of honest and efficient administration which is hard to equal. As leaders of men, their examples of firmness and of fairness and their willingness to help each soldier, sailor, marine or coast guardsman to become a useful member of the national defense team have made better citizens and more efficient land and naval forces.

Our national defense team includes not only our regular forces but our magnificent National Guard and capable Reserves. We are potentially the strongest among the nations in the world. We have not only a great reserve of manpower but our men are capable of giving an excellent account of themselves. They have a high degree of innate intelligence. They are available for service. Our scientific agricultural methods are so efficient that we can spare a greater human reserve for military effort than any other nation.

To keep from starvation, Germany needs thirty-eight out of every one hundred of its population on the farm; France, forty-five; Italy, sixty-five; Japan, seventy, Russia, eighty; and China, eighty-five to ninety. We need but twenty-two out of every one hundred to raise our food supply.

Not only do we have the manpower but we have organized it to serve efficiently in an emergency. We have a Reserve Corps of officers that has been a going concern since the early 20's and a reserve of enlisted specialists recently organized which bids fair to fill a long desired need. Our Naval Reserve force has been developed to cope with problems of the sea.

Nor is it merely in manpower that America excels the world. Our potential industrial strength is the envy of all nations. If war should come, we confidently feel that we have the men and the munitions to achieve victory but we prefer to use both in the interests of peace.

Our Army and our Navy are America's apostles of peace. They are not intended for aggression but for defense. The size of our forces is kept small and only relative to that of other nations. We deplore the cost of increased armaments. If the rest of the world were sincerely bent on peace, we would be among the first to disarm. The example set by the rest of the world, however, forbids such risk.

At the end of the World War, the United States practically disarmed itself. Possessed at the time of the Armistice of the strongest military and naval machine that has probably ever been assembled in the history of man, we proceeded methodically to scrap it. Once the roar of cannon on the Western Front was silenced, we rushed to destroy the machine that we had so strongly built. We demobilized millions of men. In a few years our Army was skeletonized to less than one hundred and twenty-five thousand. Our Navy, virtually the queen of the seas, we reduced in 1922. We gave the world an example in disarmament but we were alone. Other nations tore up blueprints while we sank heavy dreadnaughts.

In the present state of turmoil, our safety depends on an adequate army and navy. Below our present strength today we dare not venture. On the contrary, both the Army and the Navy must be built up relatively to the size of the armed forces of other nations. We must keep our powder dry.

Hand in hand with the building up of our armed forces and especially of our Navy, arises the necessity for an adequate American Merchant Marine. After the war between the States, our merchant marine slowly went into an eclipse. By 1891, it had reached its nadir. Between 1891 and 1916, many efforts were made to build it up to the position of prestige and prosperity that it had enjoyed in the earlier history of our country but few of them proved successful. The Shipping Act of 1916 came as a healthy tonic.

The operation of the Emergency Fleet Corporation, which mobilized and expanded the ship building industry of America during the World War, proved one of the epics in the history of American industrial development. Between 1917-1921, the United States Merchant Marine more than doubled. Our foreign trade tonnage was increased from less than two million to eleven million ton. Ship building yards grew to four times their original size and number. Thirty-two days after keels were laid, ships were launched. They were built of steel, wood or concrete.

With the Armistice came a steady decline in the demand for shipping and again our merchant marine fell to its pre-war levels.

Today, under the Act of 1936, and the administration of the Maritime Commission, a determined effort is being made to put our merchant marine back on a sound basis, both for defense and commerce. Congress recognized explicitly the needs of the Navy in war time auxiliaries. All subsidized construction must be approved by the Navy Department. On the Commission, are two retired admirals who understand the needs of the Navy and are familiar with the demands of commerce. A new link between the Navy and industry has been established which should accrue to the advantage of both.

Seventy-five years in the life of most nations is but a little more than the ordinary span of a lifetime. In America, it represents more than one-half of the total years of our existence. To the progress of our country during this period, the history of the Army and Navy is the history of our country. In peace and in war, their contributions have safeguarded our lives, protected our liberties and added to our happiness.

The publishers and editors of the ARMY AND NAVY JOURNAL feel that it has been a great privilege to record the achievements of our fighting men and recognize their tremendous responsibility in looking after the interests of the services at all times. The passing years have strengthened the bonds between the ARMY AND NAVY JOURNAL and the armed forces.

Together they go forward to serve their country in the interests of American life and American principles—National Defense and Americanism.

"You and I appreciate that from the time of its establishment, the ARMY AND NAVY JOURNAL has labored zealously and effectively for the National Defense; and since there can be no National Defense without an adequate Regular Army and Navy to cope with anything on the land or sea, it has spared no effort to obtain both. It has placed its influence squarely behind the Marine Corps of noble tradition. It has used its voice in behalf of submarine development. It has fought and will fight for ample air strength. It has backed the National Guard and Naval Militia, and from the time of their organization the Officers' Reserve Corps, the Reserve Officers' Training Camps, the Citizens' Military Training Camps Association, and Military and Naval Societies.

"The ARMY AND NAVY JOURNAL has fought specially for better pay for officers and men of all the Services, proper quarters and barracks for the personnel at military posts and naval stations, adequate allowances, the latest equipment for the field and the ships, and indeed, for every essential to assure comfortable living conditions and efficiency for the officers and men entrusted with the defense of the Nation. Of course, I shall continue to perform this time-honored duty. But I shall do so in ways which I believe will increase the effectiveness of the influence of the ARMY AND NAVY JOURNAL. Do you remember what Anatole France said about newspapers? That they were 'little letters of lead that spread light and reason throughout the world'? Well, that will be our aim. We will spread light and reason, and will do it interestingly. By doing so we will reach a great many more minds and enable them to form opinions based on facts."

—*From "The Publisher Makes His Bow,"* ARMY AND NAVY JOURNAL, *September 26, 1925.*

*"The President Shall be Commander-in-Chief of the Army and Navy * * *."*

President Roosevelt addressing graduates of the United States Military Academy

Boarding the USS Indianapolis to review the United States Fleet

The Origin and Development of the G

by General Ma

Chief of Staff, Un

ARMY staffs are as old as warfare. Whenever primitive men joined in tribal warfare there was a natural division of duties. Most of them were fighters. However, there were also messengers, observers, signalers, spies, foragers, medicine men and fortune tellers. With the chief were braves who served as a personal staff, carried his messages and acted as bodyguards. This rudimentary staff answered all the needs of the simple combats of antiquity.

When warfare became more complex, more specialists were needed to assist and advise the commander. Caesar had a particularly efficient staff. There were aides, scouts, spies, marshals, quartermasters, doctors, soothsayers and especially engineers. Every High School sophomore has creased his brow with agonized thought as he attempted to translate the intricate description of Caesar's bridge across the Rhine. Field fortifications and siege operations were planned and executed by ancient engineers. Polybius tells us little of Hannibal's staff but we know he had a highly efficient intelligence service and that his tactful priests always found the omens to Hannibal's liking.

From the dawn of history to the invention of gunpowder, warfare was relatively simple. It always involved close combat—hand-to-hand encounters. Nevertheless, strategy played a large part in success. Hannibal, the father of strategy, lived and fought for more than a decade and half in an enemy country, successively defeating army after army which greatly outnumbered his own. His success was due to his superb leadership and to superlative staff work performed either by himself or by anonymous advisers.

Success in war has always depended first on leadership and second on the strength, training, courage and equipment of the troops. Leadership is determined not only by an inspiring personality, but also by the sound judgment resulting from the careful evaluation of a mass of detailed information concerning the enemy's movements, the terrain and all of the other elements which enter into battle efficiency. It consists likewise in making adequate provision for the supply and movement of troops, for rapid communication and for coordinated action by all components of the army. A properly trained staff is needed to care for many of these professional details of war, leaving to the commander-in-chief or the general in the field the responsibility of making the vital decisions that may spell defeat or victory.

Armies for centuries lived off the country. Active operations were restricted to areas where troops could be readily subsisted. Forage parties gathered supplies from occupied territory. Even weapons presented only a minor problem. Hannibal continually supplied his troops with arms discarded by a fleeing foe. With the troops went armorers who fashioned bows and arrows, spears and darts, leather shields and even swords with great skill. Signal fires, drums, trumpets, manual signalling and runners constituted the communication system. The Turks were probably the first to use carrier pigeons as message bearers.

With the advent of gunpowder there was a great change in battle tactics. Artillery and musketry widened the distance between opponents. Individual combats became less frequent. Hand-to-hand encounters no longer were the rule. The elementary staff that served the general in the field became something more than messengers, scouts and foragers. With the spread of printing there came a deluge of books on the art of war. Some of the soldiers learned to read and to gain and apply a knowledge of military science. Fortifications and sieges became intricate. Tactical dispositions of troops were studied in elaborate detail. Then it was that staff officers became real advisers to their commanders and rendered professional counsel of the greatest value.

MAJOR GENERAL JAMES W. McANDREW
who was Chief of Staff, General Headquarters, American Expeditionary Forces, from May 6, 1918 to May 26, 1919.

Probably Gustavus Adolphus was the first to conceive of a general staff in the modern sense. He was the father of modern tactics. It was he who first used infantry, cavalry and artillery in a coordinated action, utilizing the fire power of the infantry, the shock action of the cavalry and the support of the artillery. His troops were kept highly mobile, ever ready for a vigorous attack and a prompt pursuit. Success depended on the closest possible coordination of all elements of his command. For this he required a well-trained and highly efficient staff.

The military system of Gustavus Adolphus was widely copied, particularly in Germany. Frederick William I, the Great Elector, enlarged the general staff system of the great Swedish leader with marked success in Brandenburg. The staff of that day was strikingly like the present staff organization. There was a constable or chief of staff, a chief of each arm responsible for its training and equipment, a foragemaster general for supplies, a provost marshal general for administration, and a sergeant major general for operations. Gustavus had an engineer in charge of fortifications, and habitually entrenched his positions. However, he avoided siege operations, using his highly mobile army in flanking operations, rather than in tedious sieges.

Frederick the Great further developed the

THE staff of a General officer, regulated according to his rank, is composed of a number of officers, generally young, who are supposed to do every thing by his real direction, as they certainly do by his nominal order. He is the head, and his the mind; they are only the hands and feet to execute. Were this always so, the characteristics of a staff officer would be only common intelligence and good system combined with energy and valor. But in reality it is far otherwise: a staff-officer exercises a real command. Very much is left to him by the General; and in many cases, to spare his chief, he assumes jurisdiction of minor matters; that is, he does the work and then signs it "by order of General ——." With this we can find no fault; it is often a necessity. But it has its attendant evils. These young officers have often a natural temptation to exercise their functions with all the spirit and manner of individual command, and thus old colonels or brigadiers are virtually ordered to do their specific duty by junior officers, acting frequently with only nominal authority. When this is known to be the case, it awakens a bitter antagonism.

It has occurred to us that for many reasons the general staff should have higher rank than at present. In the first place, their duties deserve it, being usually of a high order, and, in the second, "all appearance of evil" would be avoided.

To obviate the difficulty, let the arrangement be made somewhat as follows: Let the chief of a Brigadier-General's staff be a *Colonel*, who shall really rank every Colonel in the brigade: this would give double force and sanction to orders.

The chief-of-staff to the commander of a division should be a *Brigadier, ex officio*, ranking every brigade officer in that division, while the chief-of-staff to a corps commander should be a Major-General. These of course are but suggestions which occur to us, in attempting to improve the general staff.

The remaining staff officers would be aides-de-camp, whose duties would be restricted to the details of the office and carrying explicit orders on the field of battle, and their rank is comparatively unimportant.

In the distinct general staff there should be regular instruction, similar to that of the *état-major* of the French service, and a staff thus organized and instructed would be the very best body of officers from which to select important generals; not to the detriment of distinguished line officers; but in such a school, under the very eye and direction of the general—the very hands of his thoughts—they would have been a party to all his plans, and ready to imitate all his praiseworthy actions.

In its first volume the ARMY AND NAVY JOURNAL pointed out weaknesses in the staff practice then in vogue and urged improvements. In the above excerpt from the ARMY AND NAVY JOURNAL of October 3, 1863 note the different conception of a general staff from that of today.

General Staff of the United States Army

Malin Craig

United States Army

MAJOR GENERAL JAMES G. HARBORD
who served as Chief of Staff, General Headquarters, American Expeditionary Forces, from May 26, 1917 to May 5, 1918 and again from May 27, 1919 to August 11, 1919.

general staff, selecting brilliant young specialists and attaching them permanently to his headquarters. They were specially trained in reconnaissance, topographical and other engineering duties. He developed a system of supply depots so that the troops were no longer solely dependent on the country. It was Scharnhorst, the Prussian War Minister of a century and a quarter ago, who developed the military system which had such striking success in the 19th Century and which almost won the World War for Germany. The Prussian Great General Staff has ever been a model of scientific military planning which has amazed even the professional student. It will be recalled that the Prussian staff predicted weeks in advance with uncanny accuracy the progress of the war of 1870. The German staff knew exactly what the French could do. It knew just how much faster the Germans could mobilize than the French, just what obstacles the troops would encounter and just how they could be overcome. Small wonder then that the French were quickly and overwhelmingly defeated.

Modern staff organization in France had its beginning in the reign of Louis XIII. The increase in strength of French armies and the growing complexities of war suggested to the French monarch the desirability of lightening the many burdens of the general in chief. Hence there were created aides-de-camp, sergens generaux de bataille, quartermasters and marechaux de bataille. The duties of these officers were in general those of coordinating the action of troops preparing for or engaged in combat. Under Louis XIV the French staff organization was greatly improved. The marechaux de bataille were replaced by majors general who served as chiefs of staff. Later brigade majors and quartermasters general were added. Subsequently, the quartermasters general became adjutants general.

Napoleon had an extensive staff organization, but it was used rather than consulted by the master warrior. In the end he wore himself out with staff work. Berthier was his chief of staff, but he functioned rather as an adjutant. Napoleon's success was due more to his own transcendent genius than to the professional skill of his subordinates. He was a master of detail and he seldom delegated authority. In spite of this fact his final defeat may be attributed in some measure to the loss of many of his trusted officers, including those of his staff. Berthier had joined the Bourbons; others were utilized elsewhere. As a result the handling of Napoleon's troops at Waterloo lacked that coordination that had been characteristic of his victories.

The organization of the modern French General Staff was accomplished in 1818. The Napoleonic Wars had demonstrated the need of a highly skilled professional staff to handle the varied details of administration and tactics. Following the restoration of Louis XVIII a comprehensive study of French military organization was made. As a result the Corps Royal de l'Etat Major was created. It was in the words of General Bardin "a privileged and permanent section of a corps which was equally royal and permanent." In the same year the French staff school was established to prepare student officers for permanent service on the General Staff. Jomini's summary of the duties of a chief of staff of a field army are as applicable today to our General Staff as to the French staff of a century ago. Among these duties were:

To gather in advance the essential supplies and equipment needed for opening the campaign.

To establish and protect the necessary supply depots.

To draw up the necessary orders and routes for assembling and moving the army.

To prepare the combat orders.

To direct reconnaissances and to take other steps to obtain detailed information of the movement and position of the enemy.

To coordinate the movements and tactical dispositions of the troops.

To provide for the necessary march discipline and security.

To take the necessary steps to furnish adequate supplies and means of transport.

To select and establish camp sites and to provide for their protection.

To establish and organize lines of communications and operations.

To provide for the evacuation and care of the sick and wounded.

As to the peace-time duties of the staff, Jomini says:

"The general staff should be employed in time of peace in labors preparatory to all possible eventualities of war. Its archives ought to be found stored with numerous historical details of the past and with all the documents, statistical, geographical, topographical and strategical, of the present and the future. It is essential then that the chief of this corps and a part of its officers be permanently in the captial, in time of peace. . . .

"A good staff has the advantage of being

(*Continued on page* 121)

GENERAL STAFF OF THE ARMY.

The board of officers convened at Washington, D.C., consisting of Major Gen. Samuel B. M. Young, Major Gen. Adna R. Chaffee, Major Gen. John C. Bates, Brig. Gen. William H. Carter, Brig. Gen. Tasker H. Bliss, Brig. Gen. Wallace F. Randolph, Chief of Artillery, and Major Henry A. Greene, U.S. Inf., A.A.G., to recommend for detail forty two officers from the Army at large, including the existing staff corps and departments and the line, to complete the first organization, exclusive of general officers, of the General Staff as constituted by section 5 of the act approved Feb. 14, 1903, has made its report to the Secretary of War, who has approved it.

The board met in Washington, D.C., March 30, 1903, and daily thereafter (except Saturday and Sunday, April 4 and 5) until April 7 inclusive. Sessions averaging about seven hours per diem. All members of the board were present at each working session.

The efficiency reports of 490 officers were furnished the board. There were also furnished from the Adjutant General's Office under date of March 28, 1903, individual applications and letters of recommendation concerning twenty-one officers; under date of April 1, 1903, similar papers concerning eleven officers; under date of April 2, 1903, similar papers concerning five officers and in the same enclosure, recommendations of the Quartermaster General, Surgeon General and Chief Signal Officer; under date of April 3, 1903, similar papers concerning five officers; under date of April 4, 1903, similar papers concerning seven officers.

Recommendations by Brigadier Generals Kobbé, Grant and Goodale, by the Commissary General, Judge Advocate General, Inspector General, Chief of Ordnance, Chief of Engineers, and by the Adjutant General of the Army, with reference to certain military attachés and others, were also received and given consideration by the board.

After mature and careful consideration, the board reports that it has selected and recommends for detail, the following officers to complete the first organization exclusive of general officers, of the General Staff as constituted by Section 5 of the act approved Feb. 14, 1903, viz:

Colonels.—1. Col. Thomas H. Barry, A.G. Dept. 2. Col. John B. Kerr, 12th Cav. 3. Lieut. Col. John L. Chamberlain, I.G. Dept. 4. Lieut. Col. Enoch H. Crowder, J.A.G. Dept. (Note.—By verbal authority of the Secretary of War lieutenant colonels whose promotion before Aug. 15 next to the grade of colonel is assured have been considered as colonels in making these selections.)

Lieutenant Colonels.—1. William A. Simpson, A.A.G. Dept. 2. Henry P. McCain, A.A.G. Dept. 3. James T. Kerr, A.A.G. Dept. 4. Frederick A. Smith, I.G. Dept. 5. Crosby P. Miller, Q.M.G. Dept. 6. Charles Shaler, Ord. Dept.

Majors.—1. J. G. D. Knight, C.E. 2. Geo. W. Goethals, C.E. 3. H. A. Greene, U.S. Inf., A.A.G. Dept. 4. Edward J. McClernand, U.S. Cav., A.A.G. Dept. 5. James A. Irons, U.S. Inf., I.G. Dept. 6. Redgwick Pratt, A.C. 7. William A. Mann, 14th Inf. 8. William P. Duvall, A.C. 9. Montgomery M. Macomb, A.C. 10. William D. Beach, 9th Cav. 11. John R. Mallory, 1st Inf. 12. Samuel Reber, Signal Corps.

Captains.—1. William W. Gibson, O.D. 2. David DuB. Gaillard, C.E. 3. Benjamin Alvord, 26th Inf. 4. Joseph T. Dickman, 8th Cav. 5. Harry C. Hale, 26th Inf. 6. Charles H. Muir, 2d Inf. 7. Frank DeW. Ramsey, 9th Inf. 8. Frank McIntyre, 12th Inf. 9. Sydney A. Cloman, 23d Inf. 10. Robert E. L. Michie, 15th Cav. 11. Hugh J. Gallagher, Sub. Dept. 12. John J. Pershing, 15th Cav. 13. C. T. Menoher, A.C. 14. William C. Rivers, 1st Cav. 15. Peyton C. March, A.C. 16. William G. Haan, A.C. 17. Charles D. Rhodes, 6th Cav. 18. Horace M. Reeve, 15th Inf. 19. Dennis E. Nolan, 30th Inf. 20. 1st Lieut. John C. Oakes, C.E.

In the case of each of the officers herein named the recommendation of the board is unanimous. The board further recommends that in order to avoid having the initial detail to the General Staff terminate at the same time, certain officers in each grade shall be relieved at the end of two, three and four years, respectively, as follows:

Colonels.—At the end of two years, one; at the end of three years, one; at the end of four years, two.

Lieutenant Colonels.—At the end of two years, two; at the end of three years, two; at the end of four years, two.

Majors.—At the end of two years, four; at the end of three years, four; at the end of four years, four.

Captains.—At the end of two years, six; at the end of three years, seven; at the end of four years, seven.

The board decided that in order to prevent its recommendations becoming known to any but the proper authority prior to his action thereupon, all record of its proceedings be made by the recorder in person. There being no further business before it, the board then at 3.45 p.m., April 7, 1903, adjourned sine die.

The formation of the first organization of the General Staff is announced in the ARMY AND NAVY JOURNAL of April 11, 1903.

The Development of the United States Fleet

by

Admiral William D. Leahy, U. S. Navy

Chief of Naval Operations

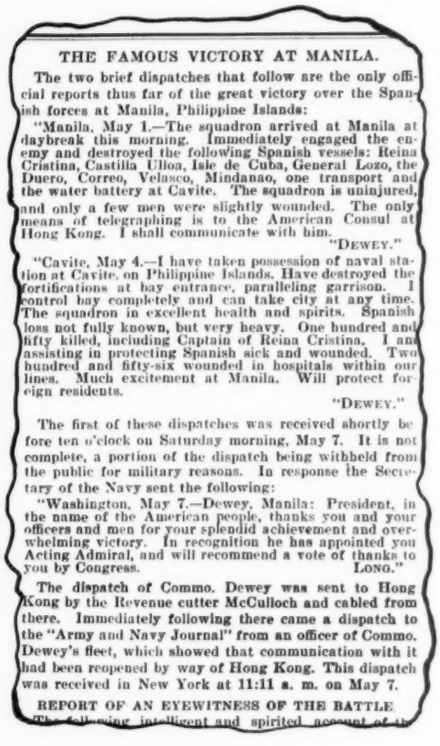
IN 1777 was hoisted for the first time the newly adopted flag on a United States man-of-war. Today our national ensign is flown on 344 combatant naval vessels, from submarines to battleships.

In the intervening 161 years we have seen wooden frigates like the Constitution gradually evolved into steel battleships like the West Virginia. The smoothbore 24-pound cannon has grown into the 16-inch rifle which shoots twenty times as far with much greater accuracy and with incomparably more destructive effect.

With every inch of canvas spread and with favorable wind, the Constitution could cover only half the distance in a day which can be steamed by our modern ships. A battleship of today can hurl against an enemy a greater mass of steel in one hour than was shot by our entire Navy during the Revolution.

But our steel mammoths of today would serve us little in time of need if the men who serve them had not the same courage which won the many glorious victories which have woven for us an invisible tapestry of worthy tradition. The same courage displayed by John Paul Jones when his ship was sinking under him was evidenced a quarter of a century later by the dying words of the gallant Lawrence, "Don't give up the ship." Nor had the advent of steam lessened the courage of our Navy a half century after when Farragut, with one of the ships ahead of his flagship sunk by a torpedo in less than 30 seconds, ordered "Damn the torpedoes, go ahead." When in 1898, sail had been completely replaced by steam, we find Dewey with calm courage steaming past the forts guarding Manila and giving the signal to commence one of the most brilliant of our naval victories with: "You may fire when ready, Gridley." In the World War we found the same quality of American courage on every American ship. Today the men who fly our naval planes, dive our submarines, and man our various surface craft give every evidence of that same indomitable courage without which planes, submarines, and ships would be worthless.

Naval historians and students of our navy agree that the courage of its officers and men is one constant which has not been affected by the ebbing and flooding of the nation's interest in the navy. Courage is as necessary as a ship's keel, but courage without skill could not fight a modern ship. Skill of the highest order is demanded of officers and men to cope with the ever growing complications of modern weapons of war. When, near the middle of the nineteenth century, our Navy began its shift from sail to steam Captain Matthew Galbraith Perry found that the lack



THE FAMOUS VICTORY AT MANILA.

The two brief dispatches that follow are the only official reports thus far of the great victory over the Spanish forces at Manila, Philippine Islands:

"Manila, May 1.—The squadron arrived at Manila at daybreak this morning. Immediately engaged the enemy and destroyed the following Spanish vessels: Reina Cristina, Castilla Ulloa, Isle de Cuba, General Lozo, the Duero, Correo, Velasco, Mindanao, one transport and the water battery at Cavite. The squadron is uninjured, and only a few men were slightly wounded. The only means of telegraphing is to the American Consul at Hong Kong. I shall communicate with him.

"DEWEY."

"Cavite, May 4.—I have taken possession of naval station at Cavite, on Philippine Islands. Have destroyed the fortifications at bay entrance, paralleling garrison. I control bay completely and can take city at any time. The squadron in excellent health and spirits. Spanish loss not fully known, but very heavy. One hundred and fifty killed, including Captain of Reina Cristina. I am assisting in protecting Spanish sick and wounded. Two hundred and fifty-six wounded in hospitals within our lines. Much excitement at Manila. Will protect foreign residents.

"DEWEY."

The first of these dispatches was received shortly before ten o'clock on Saturday morning, May 7. It is not complete, a portion of the dispatch being withheld from the public for military reasons. In response the Secretary of the Navy sent the following:

"Washington, May 7.—Dewey, Manila: President, in the name of the American people, thanks you and your officers and men for your splendid achievement and overwhelming victory. In recognition he has appointed you Acting Admiral, and will recommend a vote of thanks to you by Congress.

LONG."

The dispatch of Commo. Dewey was sent to Hong Kong by the Revenue cutter McCulloch and cabled from there. Immediately following there came a dispatch to the "Army and Navy Journal" from an officer of Commo. Dewey's fleet, which showed that communication with it had been reopened by way of Hong Kong. This dispatch was received in New York at 11:11 a. m. on May 7.

REPORT OF AN EYEWITNESS OF THE BATTLE.

The following intelligent and spirited account of the

The beginning of the publication of official reports on the great victory of our Navy at Manila; reproduced from the ARMY AND NAVY JOURNAL of May 14, 1898.

of personnel skilled in the use of steam machinery developed a serious problem. So it has been with each innovation in engineering and gunnery. The first telescopic sights were frowned upon by some of the old-timers and some were accidentally dropped overboard by the "shoot-from-the-hip" advocates. But skill has been developed to cope with each innovation until today the crew of a capital ship comprises a wide variety of skilled technicians ranging from radiomen to boilermakers. Not only have the officers and men of our fleet developed the art of operating at high efficiency the mechanisms produced by the inventive genius of generations of engineers, but in innumerable instances have they improved upon these mechanisms and added new ones of their own invention.

In an effort to attain that perfection which assures victory in battle our fleet today carries out a most rigorous training schedule year in and year out. It was drill at the guns each day under Truxton and Preble which laid the foundation for the battle efficiency of our frigates and made possible the capture of the many battle flags which line the walls of Mahan Hall at the Naval Academy, and the Navy's training today is so planned and executed that when it becomes necessary every gun, torpedo and bomb can be used to its maximum effect.

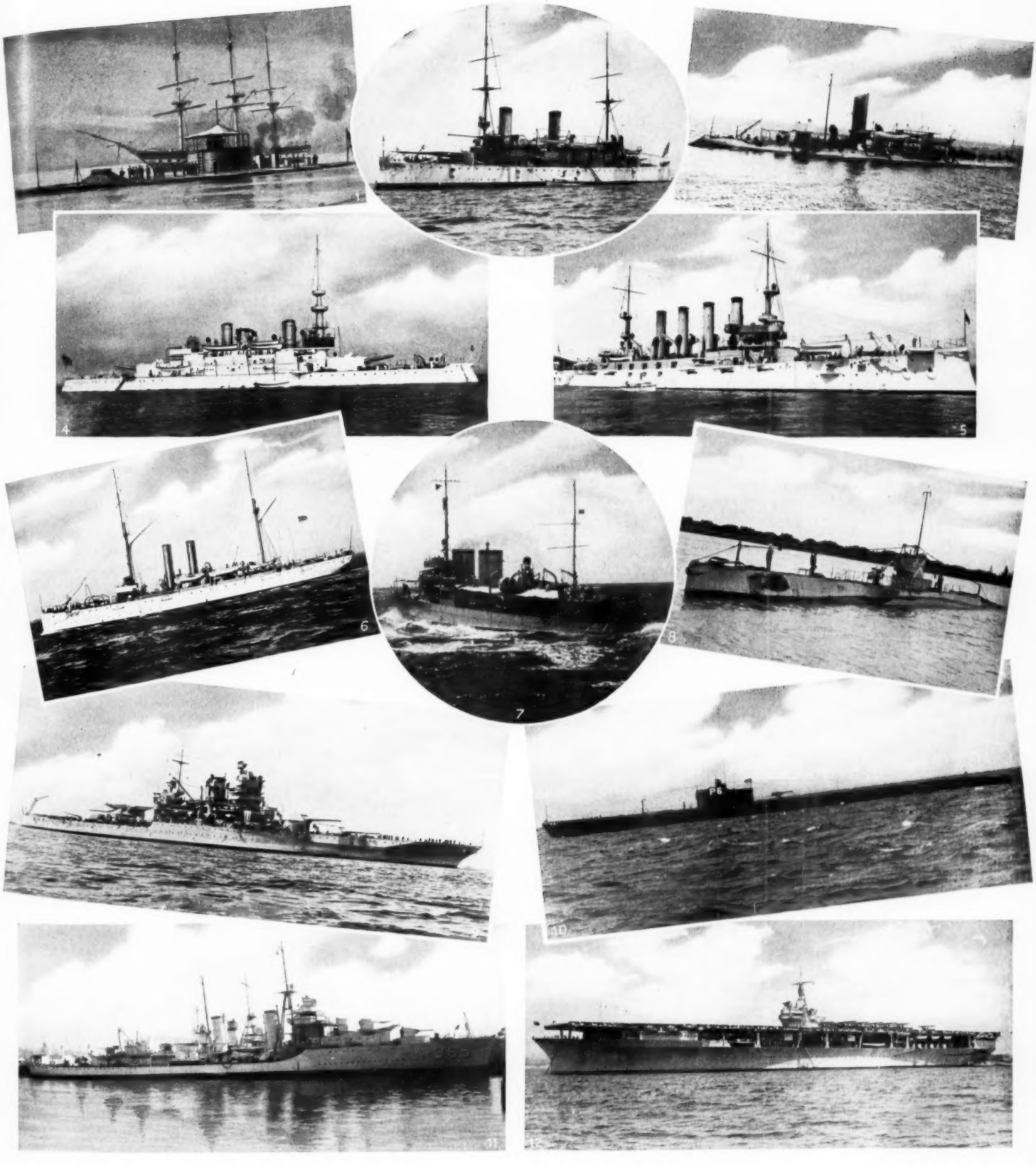
With the possible exception of the Spanish-American War, every war in our nation's history has found us with a Navy inadequate for the task at the outbreak of the war. In the days of wooden ships the deficiency could be met by the building of ships at short notice. In the case of the World War, fortune gave to us allies whose combined fleets held control of the seas until we could, at enormous expense, build up to the requirements of the situation. Today we are lacking in underage combatant ships and in auxiliaries. We are fortunate, however, in that our people, through the Congress, have wisely authorized the enlargement of the fleet and have appropriated money for the beginning of a Navy that will be adequate for our National Defense in view of the present building programs of foreign nations.

Based upon practical and theoretical analyses of all phases of strategy and tactics, the present organization of the United States Fleet is designed for the utilization of all types of men-of-war with maximum effect. Full consideration has been given to the post-war developments of offensive and defensive characteristics of ships and airplanes. The game board at the War College and recent fleet maneuvers have given convincing evidence of the soundness of the theories evolved by constant study and practice.

The United States Fleet at present is composed of four major forces, the Battle Force, the Scouting Force, the Submarine Force, and the Base Force. Under the command of their respective Force Commanders, these major units are under constant training to function with coordination to accomplish the various missions assigned by the Commander in Chief of the Fleet in preparation for the defense of the Nation.

When the present building program is completed the United States will have for the first time a homogeneous fleet, well balanced, and equipped with modern weapons and machinery. It should be adequate to protect America against serious attack by the naval force now in process of completion or at present contemplated by any single foreign nation; and manned by courageous, skilled, and loyal personnel it should be the greatest insurance of peace our country can have.

It is my hope and belief that by discouraging aggression it will preserve peace for America.



Probably the greatest period of development in fighting ships has been that from Civil War vessels to date. The forerunner of modern armored vessels is John Ericsson's Monitor. (1) shown with its predecessor, an old sailing vessel, in the background. By 1888, vessels of the type of the famed cruiser USS Olympia, (2), built by the Union Iron Works (now the Bethlehem Shipbuilding Company) were coming forward. The Bath Iron Works built the ram, USS Katahein, (3), a type no longer in use. In 1890 the battleship USS Oregon (4) was authorized, this ship, too, being built by the Union Iron Works. This is the vessel that made the trip around the Horn in 1898 to join the U.S. Fleet. The armored cruiser, USS Seattle (5), formerly the USS Washington, was built by the New York Shipbuilding Company in 1902. About the same period cruisers such as the USS Cleveland (6), a product of the Bath Iron Works, were on the seas. During the World War the United States built many destroyers of which the USS Ramsay (7), built by the Newport News Shipbuilding and Dry Dock Corporation, was one. A World War submarine was the R-12 (8) built for the Electric Boat Company by the Fore River Shipbuilding Company. In 1919 Congress authorized the USS Idaho (9) which was built by the New York Shipbuilding Company. In more modern vessels we have the submarine, USS Pickerel (10) built by the Electric Boat Company, the destroyer 365 (11), product of the United Dry Dock Corporation, and the modern aircraft carrier, USS Ranger, from the ways of the Newport News Shipbuilding and Dry Dock Corporation.

The United States Marine Corps

by

Thomas Holcomb

Major General Commandant, U. S. Marine Corps

AT the time of the founding of the ARMY AND NAVY JOURNAL the Marine Corps, like our other regular services, was participating in the far-flung operations of the Civil War. Its strength was approximately three thousand—the maximum up to that time. With that small force it maintained nearly one hundred detachments on board vessels of the navy and furnished protection to ten naval shore establishments. It had not gained the position in the public eye that it now has.

During the years between the Civil War and the War with Spain the Marine Corps like the other regular services was shunted into the background and given very little support or attention. It continued to perform its traditional functions and participated in landing force operations in different parts of the world as in the earlier years of its history. Conspicuous examples of the latter duty were the participation of a small brigade of marines in the naval expedition to Panama in 1885 which helped to suppress a revolution and reestablish the safety of the Isthmian transit, and a punitive expedition into Korea. Such landing operations helped to keep alive the fighting spirit of the Corps during the otherwise uneventful years.

The marines received considerable recognition during the War with Spain for being the first to land and carry out a military operation in Cuba. Their enhanced popularity led to several substantial increases in their strength and to their wider use as part of the country's naval forces. Marines on board vessels of the navy during that war performed conspicuous service during the Battle of Manila Bay and the naval victory at Santiago. But these experiences of the marines were not as striking as those they had in the Far East during the Philippine Insurrection and in the Boxer Uprising. After campaigns in the Philippines they hurried to China for the relief of the foreign legations in Peking. A small battalion under Major L. W. T. Waller landed first and with some other foreign troops fought its way to Tientsin, assisted in the relief of Admiral Seymour's expedition and later took part in the storming and capturing of Tientsin. Waller's battalion was increased by a regiment under the command of Major W. P. Biddle and formed part of the relief column which fought its way to Peking and relieved the legations. They returned to the Philippines and in addition to occupying a portion of Luzon, sent Waller's battalion to the island of Samar where it carried on a series of campaigns against the warlike Moros and suffered severely during an ill-fated march across that island. The experiences in the Far East served as a preparation for larger fields of usefulness.

MAJOR GENERAL THOMAS HOLCOMB

A brigade of marines occupied Panama at the time it declared its independence and guarded the Canal Zone until relieved by the Army. Another marine brigade occupied parts of Cuba in September 1906 to restore order and a regiment remained there with a reinforced army brigade as the Army of Cuban Pacification until early in 1909. Violent revolutions in Nicaragua led to our sending a battalion of marines to its east coast in 1910 and later on a larger expeditionary force to its west coast, which together with a navy landing force carried on a campaign against the troublesome bandit forces, helped to restore order and left a legation guard of marines in Managua where it remained for thirteen years as a stabilizing force.

Scarcely had the marines withdrawn from Nicaragua than similar conditions in Mexico prompted the Wilson Administration to intervene at Vera Cruz. A regiment of marines, later increased to a reinforced brigade, together with navy landing forces occupied the city in April 1914 and held it jointly with an army brigade until the following November. Following this experience a brigade of marines occupied Haiti during a violent revolution in the summer of 1915, suppressed a rebellion of the lawless cacos and established peace in the country. After a long and trying campaign they put down another caco revolt five years later and continued to occupy Haiti until 1934 when they withdrew leaving the country with a well-trained constabulary. The intervention in Haiti had scarcely begun when the marines started a similar one in the Dominican Republic. They seized its capital and a regiment which arrived some weeks later defeated the rebellious forces after an extensive campaign, established peace and maintained a military government for several years. Eventually civil government was reestablished and the marines withdrew in 1924, leaving a trained constabulary and vastly improved conditions.

The Marine Corps grew from less than three thousand at the outbreak of the War with Spain to more than fifteen thousand in 1916. During the World War it underwent a further rapid expansion to more than three thousand officers and 75,500 enlisted men, and extended its activities to many far-flung theaters of operations. Its most important war service was that of the Fourth Brigade in the A.E.F., which participated in five major operations and had a fighting record comparable to that of any troops on the Western Front.

The marines carried on extensive operations in Nicaragua, 1927 to 1933, where they assisted in restoring peace and trained a native constabulary. In 1927 they sent a regiment to Shanghai, China, to protect our interests and later more troops to form a brigade which, in the status of a landing force from the U. S. Asiatic Fleet, in addition reinforced Tientsin.

With the cessation of interventions in Latin-American countries by marines as a result of the "good neighbor" policy, the Corps has found time more fully to develop a Fleet Marine Force which is its principal mission and which is an integral part of the United States Fleet. The number of marine detachments on board vessels of the Navy, as well as at naval shore establishments, is constantly increasing. The Marine Corps today finds itself drawn more closely to the Navy as an integral part thereof.

THE MARINE CORPS.

The United States Marine Corps has celebrated the hundredth year of its existence by playing a gallant part in some of the most stirring events in our history. It was the first organization in the service to strike the enemy on land in this war, and held itself gallantly at Guantanamo not only against the annoying attacks of the first four days, but in the operations that finally put a stop to Spanish fighting. There were two companies of Marines with some Cubans on that day, and the enemy numbered five hundred men. Lieut. Col. R. W. Huntington, in describing this affair, which took the Marines over six miles and lasted four hours and a half, says: "Our troops drove the enemy at every point, being obliged to make the first advance for about twenty minutes under fire which, owing to the lay of the land, they could not return. Capt. Elliott reports that the men, in many cases, coolly estimated distances, borrowed his field glass to pick up parties of the enemy, and at a distance of 1,000 yards often inflicted damage and caused withdrawal." This was our first experience of fighting in the difficult cactus jungle and on the steep hillsides of Cuba, under a burning sun that sent twenty-three men back to their vessel, overcome by heat. Limited as the force was in comparison with that afterward engaged at Santiago the terms in which Lieut. Col. Huntington describes the affair would serve in a general way for some of the larger operations there. "Too much praise," he says, "cannot be awarded to the coolness, skill and bravery of our officers and men, by which alone its success was achieved. Capt. Elliott's cool advance up a rocky, steep, mountain path, under fire for twenty minutes, without being able to return it, and the gallantry and skill displayed by him throughout this affair were essential to the great success attained by the expedition, and are worthy, and I earnestly recommend, that he be advanced in rank one grade." Capt. Elliott's name was included in the list of promotions published Aug. 13.

On shipboard the Marines have done gallant service in the two great fights that have sustained the fame our Navy has won in recent years. In the Brooklyn the

From the ARMY AND NAVY JOURNAL of August 27, 1898.

The United States Coast Guard

by

Rear Admiral Russell R. Waesche

Commandant, United States Coast Guard

THE last seventy-five years have seen many changes. Many organizations in existence in 1863 are no longer extant. The ARMY AND NAVY JOURNAL, however, has survived and is now celebrating its diamond jubilee. The Coast Guard congratulates the magazine and its editors on a long and able career of accurate reporting in the field of military affairs.

The relations between the Coast Guard and the JOURNAL have always been most cordial. From its very inception the JOURNAL has carried reports of the varied activities that the Service has undertaken. True it is that strictly speaking the Coast Guard, as such, is much younger than the JOURNAL. But the two services that were amalgamated to form the Coast Guard in 1915 have had a record as long and honorable as the ARMY AND NAVY JOURNAL. Everyone knows that the Revenue Cutter Service was organized back in 1790 by Alexander Hamilton to help in "securing the customs." And the Life Saving Service, gradually taking form out of private humanitarian efforts by such organizations as the Massachusetts Humane Society, received assistance from Congress in 1871 and was set up as a separate branch of the Treasury Department in 1878.

A short reference to the Revenue Cutter Service in the first issue of the JOURNAL, August 29, 1863, indicates several points of interest. It shows the type of reporting which the JOURNAL used in those days. Furthermore, it tends to prove the fact that the Revenue Cutter Service maintained its identity in the War between the States to a much greater extent than in any other war before or since. The first point will be obvious; the second may require some elaboration. But let us see exactly what the article said:

Revenue Cutter Service

"There is nothing new to make mention of in the revenue cutter service. The six new steam cutters are progressing finely, and by the first of next year they will all be officered and manned and doing duty on the coast.

"The steamer Cuyahoga, Captain John McGunn, arrived on Tuesday evening, having on board Mr. Harrington, Assistant Secretary of the Treasury, Hiram Barney, Esq., Collector of the Port of New York, and Mr. Stillman, Inspector of Supplies and Equipments for this district. These gentlemen have been on a visit to all the ports of entry on the eastern coast, scanning all the revenue cutters, customs houses, &c on their route."

Precedents of long standing plus laws and executive orders had provided for cooperation with the Navy in time of war. And, of course, in this war there was cooperation in some of the raids and fleet actions. But the

Rear Adm. Russell R. Waesche
Commandant, United States Coast Guard

Revenue Cutter Service received its regulations from the Secretary of the Treasury in 1862. The fact that this identity was thus preserved probably arose from the blockade nature of the war on the sea. The Revenue Cutters were merely operating according to their usual custom. For example, the officers of the Jackson boarded, during the month of August, 1863, over a thousand vessels off the port of Baltimore.

Added proof that the Revenue Marine remained under the Treasury Department during this eventful period comes to light in a long article on the service in the ARMY AND NAVY JOURNAL for November 26, 1864. The revenue cutters are called in the headline of the article: The Treasury Department's Naval Force. Much praise is bestowed on the activity of Mr. Harrington of the Treasury Department in building six new screw-steamers. The writer of the article then goes on to say:

"These vessels mark a new era in the history of the Revenue Marine, and foreshadow the future rise and progress of this branch of our national floating defenses. The vessels are far ahead of anything we have had of their character; and there are promises that they will be improved upon at an early day. We need great speed in revenue vessels: as we have said before, they should be the fastest afloat carrying heavy batteries. Keeping always under steam, and *ever ready* in the event of extraordinary need to render valuable service, they can be made to form a *coast guard*, whose value it is impossible at the present time to estimate."

The italicized expressions in the above extract indicate how prophetic the writer really was. Today the motto of the "Coast Guard" is "Semper Paratus."

While President Lincoln's "civil disturbance" theory of this war kept the Revenue Marine from actually becoming a part of the Navy, in 1898 we definitely declared war on Spain. But even here some of the cutters remained under the Treasury Department, although when ships were transferred the Navy paid the men. An executive order dated April 9, 1898, provided for the transfer of most of the cutters that joined the Navy, but specific orders were issued for each ship. The Calumet, however, was transferred as early as March 24, while the Winona merely received orders to "act in concert with the Navy." Most of the ships returned to the Treasury Department on August 15, 1898.

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An outstanding example of modern ship building is the modern 328 foot cutters of the Coast Guard one of which, the Spencer, is shown above. Compact, powerful, they carry weapons of war and mercy. Note airplane on board.

Our Merchant Shipping Problem

by

Emory S. Land

Rear Admiral, United States Navy, Retired

Chairman of the United States Maritime Commission

THE merchant marine has become the nation's problem child. For the past 20 years we have been attempting to cope with it with very little success. The record of its development in that time is indicative of the complexities of its character which have resisted both legislative and governmental efforts in solving it.

Our present merchant marine was born full-grown during the World War when under the lash of necessity and as the result of previous neglect of our shipping, we created almost overnight a maritime fleet of 2,500 vessels which were to have been the "Bridge of Ships" to France over which our men and our supplies were to cross to the battlefront.

Meanwhile, having learned, and having paid dearly for the lesson, of the folly of depending on alien vessels to transport our commerce, and resolving never to be caught in the same precarious position again, we set out after the war with the great armada to regain our once high place among the maritime powers of the world.

Under these propitious circumstances, and considering our determined purpose, it would be natural to assume that our merchant marine would become increasingly strong and powerful. Unfortunately, the exact reverse took place. It flourished briefly but it was not long before the program was blighted by vicissitude in the way of vacillating and vague governmental policies, financial troubles, labor troubles, the depression, mismanagement, extravagance and public scandal. As a result our shipping program lapsed into a period of decline which has brought us to the point where we must practically build a new merchant marine if we are to have one worthy of the name. Little remains except our original resolve to have a first-class merchant fleet which is still as strong as ever despite our many disappointments and failures.

While we have been drifting, our foreign competitors have been diligently building fast, modern ships that can be operated cheaply and more efficiently. Our slow and aging vessels must compete with these ships in the international trade. It is a losing struggle. The handicap can only be overcome by building new ships and fast ships!

Under the Merchant Marine Act, the Maritime Commission is making a fresh start on the program to restore and maintain an adequate Merchant Marine. The core of this rehabilitation program is replacements. As a consequence of our neglect our needs have become tremendous. Our total seagoing fleet consists of 1,422 vessels of 2,000 tons and over, aggregating 8,470,000 tons. Of this fleet, a total of 1,305 ships of 7,402,000 tons will be obsolete by 1942. To replace all the ships now nearing obsolescence would require the construction of 261 vessels of about 1,500,000 tons per year for the next 5 years. Such a program would cost in the neighborhood of $2,500,000,000 at current price standards for labor and material.

Badly as the merchant marine needs new ships, there is no thought of such a prodigious undertaking. Our plans are to build for our minimum needs. This represents a more rational approach. A careful survey of the requirements of our commerce and for purposes of national defense indicates that minimum needs call for 500 new ships in the next 10 years. These ships will cost approximately $1,250,000,000. This is our tentative goal. At first glance, it might appear that this program will provide much less than half the number of ships needed to replace our merchant fleet but it must be remembered that the new vessels will be considerably faster than the present ships and by reason of their increased speed, fewer ships will be required to perform the service.

This reconstruction has begun. In the past year, the Maritime Commission has let contracts for the construction of 37 new ships which surpasses the number built during the entire life of the 1928 Shipping Act, which the present Merchant Marine Act superseded. These vessels include 12 high-speed tankers, 24 fast cargo ships, and a model safety liner to replace the Leviathan in the North Atlantic service. Fourteen additional ships must be laid down this year by subsidized shipping lines under the terms of their subsidy contracts. In addition, the Commission is planning to build 24 vessels of both the cargo and passenger-cargo liner type for the rehabilitation of our Pacific Coast services, and it is hoped that some of these ships can be laid down this year. It can be seen that the Commission already has in sight its first year's quota under its reconstruction plans.

As the Commission's construction program expands, and the contemplated Navy building program gets under way, it is obvious that present shipbuilding facilities will probably be taxed beyond capacity and that some rehabilitation and some expansion will be necessary to accommodate this tremendous volume of new building. But the situation does not justify a "gold rush" for the shipyards. The Commission has no intention of encouraging wildcat shipbuilding. Small firms and new firms will have an equal opportunity to obtain a share of the new construction providing they satisfy the Commission that they possess the financial resources and the building facilities to perform their contracts. They must have more than a prospectus and a prayer.

The principal reasons for having a merchant marine are to preserve and protect our ocean borne commerce, and to equip the Navy with an efficient auxiliary fleet for use in time of national emergency. The public supports it with its taxes. It has the additional obligation of supporting it with its patronage, but the American shipping public and the American travelling public which use ships for their business and pleasure are not giving it this support.

Last year, the dollar value of our foreign trade was nearly six and a half billions of dollars, the largest since 1930. American ships carried only 35 per cent of this traffic!

In the same year, 366,500 American citizens travelled overseas but only 30 per cent of them travelled on American ships!

If American ships carried their proper share of this commerce and traffic, we soon would have a prosperous merchant marine, and it is conceivable that there would be a diminishing need for the government's support through subsidies, or in another word, taxes.

While American vessels generally because of their age and slowness are at a serious disadvantage in competing with the fast modern vessels which foreign nations have been diligently building while we have been dormant, we have some splendid ships in our foreign trade fleet. These are the 33 ships that were built under the ocean mail contracts system through which Congress, recognizing that the merchant marine was wearing out, attempted vainly to provide an adequate method of replacements. In their class no other country has better ships. As for safety, the record of the American Merchant Marine as a whole has been consistently high.

With the exception of the super liner services, American steamship companies offer service from some of our ports for both cargo and passengers that is equal if not superior to that of foreign lines. Yet American shippers through these ports give the foreign flag shippers the bulk of their patronage. These same shippers would be the first to call for help if the foreign ships on which they depend were suddenly shifted elsewhere by disorders at home. This is precisely what occurred in 1914 when our goods rotted and rusted in piles on our wharves because the foreign vessels on which we so complacently relied to transport them had been suddenly diverted elsewhere by the war. Our producers suffered incalculable losses and the experience is one of the reasons why Congress in the 25 years that have intervened has consistently legislated for an adequate merchant marine. With the unrest that now prevails throughout the world, this could easily happen again at any time.

There are some conditions that are beyond the control of American shippers which compel him to patronize foreign ships. His customers abroad may demand for reasons of patriotism or economy that their purchases be transported on ships flying their own flag. We

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The CCC and Industry

by

Robert Fechner

Director, Civilian Conservation Corps

FOR the sixth successive summer, the young men and war veterans of the Civilian Conservation Corps are at work in a great nation-wide chain of outdoor camps located in the nation's forests and parks, upon agricultural lands menaced by soil erosion, on wildlife refuges, on reclamation projects, on the grazing lands of the far west and on the Winooski River Flood Control project in Vermont. Since the Spring of 1933, when the Corps was launched by President Roosevelt, the forests, parks and other outdoor areas where the CCC has been active, have furnished employment to more than 2,000,000 enrolled men and close to a quarter million reserve officers, foremen and other supervisory personnel, administrative employees, educational advisers and skilled and semi-skilled workers. At the present time the enrolled strength of the Corps is 300,000.

The enrollment of the more than two million men and their employment on useful conservation projects widely distributed throughout the breadth and length of the whole country, has entailed a huge amount of careful planning and much careful administrative and supervisory work.

Four Government departments, the Veterans Administration and a host of state agencies have cooperated wholeheartedly with the office of the Director of the Civilian Conservation Corps in the administration of the camps and in the prosecution of the camp work programs. Through a carefully thought out and wise division of work, the Corps' operations have proceeded smoothly and efficiently. Our records show that both the enrollees sent to the camps and the nation have profited through the CCC program. Enrollees have won improved health, have developed a saner outlook toward life and have obtained educational and training advantages which improved their chances for success. The present and future values of the nation's large timbered areas, as well as its agricultural lands, have been substantially increased by the protective and improvement work of the Corps.

The Department of Labor through State Selection Agencies selected the first men for the CCC and this department has been responsible for the selection of all juniors since that time. The War Department has utilized its extensive and widely distributed administrative and supply establishment to enroll the men, pay, feed, clothe, shelter and look after the welfare of all enrollees and construct and administer the camps. The Department of the Interior and the Department of Agriculture have planned and supervised all work programs.

As a general thing, I believe that the average person is well acquainted with the results which the Corps is achieving in the planting of trees, the protection of forests, the control of destructive soil erosion on valuable farm lands and the development of new recreational facilities. The public is well aware of the human reclamation values of the Corps. Not so much is known, however, of the important contributions which the CCC has made and is making to business, agriculture and industry. A careful study of the CCC record discloses, however, that the maintenance of a huge housekeeping establishment such as the CCC and the prosecution of a great nation-wide conservation program has necessitated large purchases of foodstuffs for feeding the enrollees, clothing, stoves, lumber, hardware, shoes, boots, trucks, automobiles, tractors, medical supplies, books, athletic equipment, building supplies and a wide variety of other equipment.

Virtually every industry engaged in the production, processing or distribution of staple supplies, materials, equipment or services has benefited directly or indirectly from the huge orders for supplies that have been contracted for by the Corps in recent years. While consumer's goods industries have received the bulk of the orders, more than 45,000 trucks, thousands of tractors and considerable quantities of heavy equipment have been purchased from the automotive industry and manufacturers of durable goods.

To date, approximately $2,000,000,000 has been expended upon the CCC program. Of this more than one-half was expended for foodstuffs, clothing, supplies and equipment. More than half a billion dollars was paid in the form of cash allowances to enrollees and transmitted in large part to needy dependents at home. Virtually all of the two billion dollars quickly found its way into business, trade channels and into the pockets of the farmer. Small businesses, as well as large ones, have been aided. Civilian Conservation Corps camps each spend from $3,000 to $5,000 monthly in the communities in which they are located.

Each year large orders go to the manufacturers of soap, tooth paste, tableware, kitchen utensils, shoes, shirts and scores of other articles needed in the conduct of an organization which daily feeds, clothes, houses and looks after 300,000 men. In fact, there are few industries engaged in the production, processing or distribution of staples, supplies, materials, equipment or services which do not in some measure benefit from the CCC purchases.

Millions of dollars worth of orders have gone to industries which supply materials needed in the construction and equipment of the camps. Some idea may be had of the number of industries involved by listing the varied materials needed. These include lumber, cement, hardware, glass, cane and other fibres and aluminum, for insulation; paper and bituminous material for roofing; paint, electrical machinery and supplies, insulated wire, water-pumping machinery, pipes, sanitary and other plumbing equipment and supplies, stoves and ranges, fire extinguishers and many other allied items. Whenever practicable, electricity and water supply are obtained from local companies, thus contributing to the support of those industries and, incidentally, benefitting local employment.

Construction completed, camp buildings must be equipped and furnished for occupancy, the men must be supplied with food and clothing and implements must be furnished for their work. Dealers and manufacturers of kitchen equipment, china, glassware, typewriters, stationery, office machines and furniture, hand tools, brooms, brushes, toilet paper and other miscellaneous and sanitary supplies benefit from these purchase orders and thousands of American workers are given employment. As a graphic example of the wide distribution of this money and the diversification of purchases, it is interesting to note that procurements are made by purchasing depots located from New York to California.

The automotive and heavy equipment industries have already benefited to the extent of more than $35,000,000. In excess of 45,000 automotive units have been purchased to carry on the work in the camps. Although the total number of motor vehicles purchased is relatively small compared with the capacity of the automotive industry, the early purchases were made at a time when the factories were being operated on reduced production schedules. Contracts for motor vehicles for the CCC permitted, in some instances, the employment of additional workers and in other cases prevented laying off employees whose services it was desired to retain. This stabilization of employment was felt not only in the plants of the body and chassis assemblers, but extended also to the manufacturers of units and the producers and converters of raw materials.

The operation and maintenance of these vehicles necessitates almost constant procurement of new units and supplies. Purchase of the vehicles for War Department CCC use is centralized in the Office of the Quartermaster General, but procurement of operation and maintenance supplies is made by the various field agencies. In this way funds are generally used locally for purchase of these supplies and services when and as required, thus obviating delays incident to the issuance by a central authority of individual permits for such expenditure. The local expenditure of these funds tends to a wider distribution of them throughout the country to the benefit of small industries, local dealers and working men.

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National Defense and the Aviation Industry

by

Major General Oscar Westover

Chief of the Air Corps, United States Army

IN discussing the Army's contribution to aviation, the survey may well fall into three subdivisions: the period before the Great War, the time of the Great War, and the post-war period.

The Army early demonstrated an interest in aviation. The first Commander and Chief, General George Washington, in 1793 gave a letter to Monsieur Blanchard at the time the latter was about to make the first balloon ascension in this country. The following are a few brief extracts from the President's letter which Blanchard carried in that flight:

"George Washington, President of the United States of America.

To All to Whom these Presents shall come.

The bearer hereof, Mr. Blanchard, a citizen of France, proposing to ascend in a balloon from the city of Philadelphia, at 10 o'clock A. M. this day, to pass in such direction and to descend in such place as circumstances may render most convenient — these are therefore to recommend to all citizens of the United States, and others, that in his passage, descent, return, or journeying elsewhere, they oppose no hindrance or molestation to the said Mr. Blanchard: And that on the contrary, they receive and aid him with that humanity and good will which may render honor to their country, and justice to an individual so distinguished by his efforts to establish and advance an art, in order to make it useful to mankind in general."

It will also be remembered that Count Zeppelin credited the experiences he had while an observer with the Union Army in the Civil War with stimulating his initial interest in balloons which eventually resulted in the giant dirigibles which bear his name.

Many names of Army personnel are indelibly connected with balloon and airship experiments and striking lighter and heavier-than-air flight accomplishments from that initial ascension until the Great War.

Soon after the demonstration by the Wright Brothers of the feasibility and practicability of heavier-than-air flight, the Army realized what the airplane might do to the battlefield. Twenty-nine years ago, our military establishments wrote the specifications and asked for bids on an airplane suitable for military purposes. On July 29, 1909, tests of the Wright airplane having proven satisfactory, it was accepted by the Army and became, therefore, the first military airplane in the world.

Our Army has been severely criticized in some quarters for not having built up a larger flying establishment prior to our entry in the Great War. It has been pointed out that whereas in the year 1914 Germany appropriated $28,000,000 for military aviation, the United States appropriated but $430,000. Much has been made of the fact that, despite the experiences during the first two years of the Great War and the great emphasis placed on aviation as a military weapon abroad, in April 1917 the flying forces of the United States contained but 52 flying officers, 1100 enlisted men and 59 nondescript planes of all types.

While the terms of this indictment are correct, the blame has generally been placed erroneously. Military files are replete with pleas on the part of military authority for sufficient funds with which to develop an air arm of suitable size, as the following quotations from the annual reports of Major General James Allen, Chief Signal Officer of the Army, conclusively prove:

—1909—

"All first class powers, except the United States, are systematically providing themselves with aerial fleets, Germany and France being notably in the lead. The United States does not, at present, possess a modern aeronautical equipment and it is believed that a systematic plan of development of this military auxiliary for national defense *should be inaugurated without delay.*"

—1910—

"For military purposes aviation is a subject which we must seriously consider, whether we wish to or not, and the sooner this fact is accepted and measures taken to put us abreast with other nations, the better it will be for our national defenses."

Our sorry showing in military aviation at the outbreak of the World War is directly attributable to the inability of the Army to procure adequate funds for the establishment of a military air arm of a magnitude comparable to that of other leading powers.

The opinion seems all too prevalent that the aviation program of the United States in the Great War was little short of a scandal; that vast sums were expended with little return therefor; that there was great confusion in production and that air operations were ill-organized and inefficient. Such, I think, is a great mistake. That opinion is based on ignorance of the facts. Here is the true story: Beginning with that nucleus of 52 flying officers, 1100 enlisted men and 59 planes, within the short space of 18 months the United States Army built up an air complement of about 20,000 officers, 149,000 enlisted men and 16,000 planes. During that same period the aviation industry in this country had grown from a few isolated struggling factories, manned with but a handful of experienced personnel, to an organization capable of producing during the last year of the War, 23,000 planes and 30,000 engines. One factory, when the Armistice was signed, had contracted to deliver to the Government 100 airplanes a day.

Of course, there were instances of chaos and confusion, understandable mistakes were made, but, all told, it was a tremendous achievement, an accomplishment of unprecedented magnitude, particularly considering the size of the air establishment we had at the beginning and the state of the industry in 1917. That war-time increment of factories, personnel, flying machines and pilots was the essential nucleus of the great aviation industry in this country today. It was the beginning of what we now boast, and rightly so I think, as the finest aeronautical organization and industry possessed by any country in the world.

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Typical of the general employment to which aviation is put in the Army is the use of aircraft by Maj. Gen. Frank R. McCoy, USA, commanding general of the Second Corps Area, in flying to inspect Army installations and troops in Puerto Rico. The photograph shows General McCoy, Maj. Gen. Frank M. Andrews, and the officers of the plane. Incidentally, on the return flight they set a non-stop distance record of 1,410 miles for amphibians. In the photo, left to right, are General McCoy, General Andrews, pilot; Maj. John F. Whiteley, co-pilot; 1st Lt. Joseph A. Miller, navigator; and 1st Lt. Hugh F. McCaffert, navigator.

Development of Naval Aeronautics

by

Rear Admiral A. B. Cook, U. S. Navy

Chief of the Bureau of Aeronautics

AMERICAN inventive genius gave the airplane to the world in 1903 and while it was not until five years later that the Navy took specific steps to determine the actual value to the Service of this new instrument, its potential value had been recognized previously by far-seeing naval officers.

The first naval officers to become aviators, trained by Curtiss and the Wrights, were firmly convinced that the Navy could use aviation effectively in promoting its own capabilities and efficiency. Their efforts were directed and their experiments carried out with this idea in mind.

Capt. W. I. Chambers brought to the Navy not only a vision, but the resourcefulness and force necessary to make that vision a practical reality. It was due largely to his efforts, that the Navy as a whole was made conscious of the possibilities of a naval aviation. As early as November, 1910, a flight was made from a platform constructed on the bow of the USS Birmingham, followed two months later by a landing and take-off from a platform built on the stern of the USS Pennsylvania. In these early attempts was born the present day aircraft carriers.

A device for hoisting and lowering a hydroplane to and from a surface ship was perfected by Glenn Curtiss and Lt. T. G. Ellyson, the Navy's first aviator, and in February, 1911, was successfully demonstrated. The flights in connection with this demonstration greatly stimulated aviation interest both in this country and abroad. This was the first step toward the employment of aircraft aboard battleships and cruisers as we know it today, for the demonstration was shortly followed by the building of the first catapult at the Naval Gun Factory, Washington, D. C. in 1912.

The first and second "shots" from this device were made by Lieutenant Ellyson; the first being unsuccessful the catapult was redesigned. The second shot, on Oct. 12, 1912, was the first successful catapult launching of an airplane.

Another achievement worthy of note which occurred in 1912, was the construction of the aerodynamic laboratory or wind tunnel at the Washington Navy Yard for the obtaining of aerodynamic data. In connection with the laboratory a model basin was also constructed to obtain information pertaining to floats and hulls.

With a mere handful of youthful naval officers working with equipment which, in the light of present day development, was unreliable and inefficient to say the least, operations with the Fleet were carried out and basic experiments and tests were undertaken which were far in advance of the materials at hand. Nevertheless, tremendous progress was made. The period, therefore, between 1908 and extending through the World War may be said to be the experimental stage of naval aviation. The experience gained during the World War proved beyond question the great value of planes with the Fleet and the Navy from that time proceeded with confidence and energy to make aviation an integral part of the organization.

The fruits of experimentation and effort began to appear when in 1922 the Langley introduced carrier operations in the Fleet and the regular participation of patrol planes in Fleet exercises was initiated. Shortly thereafter planes and catapults became part of the regular equipment of all battleships and cruisers.

Immediately after the World War both civil and naval aviation developed slowly. The Navy had on hand a considerable amount of aircraft of wartime construction and few new airplanes were purchased. However, extensive research was carried on and when, as a result of an extensive study made by the Morrow Board, Congress enacted a law providing for the gradual procurement of new modern aircraft, the strength of naval aviation was set at 1000 serviceable airplanes.

This Board recognized the obvious importance of the aircraft industry in relation to national defense and set forth in its findings the following opinion:

> "The importance of the aircraft industry to national defense is obvious" . . . . . "Anything that strengthens the industry as a whole, and especially anything that conduces to the strengthening of the design and engineering departments of the companies building aircraft, must be considered as a contribution toward national defense."

Since 1930, the commercial growth of aviation in the United States has been almost a phenomenon. The record of safety in passenger carrying unquestionably goes to this country, which is due in no small measure to the determination of the aircraft industry to turn out only the most practicable and at the same time the finest products. The same manufacturers who are building commercial aircraft are also producing airplanes and engines for the Navy under Navy Specifications. With the increase of reliability, speed and endurance, Naval Aviation has been enabled to increase its own record of efficiency. A continued and close cooperation between the Navy and the aircraft industry has been maintained.

The Navy continued to operate under the limitation set by the Morrow Board until the passage of the Vinson-Trammel Bill in 1934. The aircraft program laid down to meet properly the requirements of this bill called for approximately 2000 airplanes by 1941. The building program is going ahead in a highly satisfactory manner and today we have on hand on order or funds for more than 1800 first line planes. When the present planned program is complete the Navy will have a total of 68 combatant squadrons, of which 37 will be ship based, 22 tender based and 9 attached to the Fleet Marine Force. The extent of this expansion may be realized by comparing the naval aviation strength of 54 airplanes in April, 1917, with today's total.

Along with the expansion of the number of aircraft there has been a necessary expansion of pilot personnel. From a total of 49 officers who were qualified, up to the time of the United States' entrance into the World War, there are now, assigned to regular Naval Aviation, 1007 officer and 357 enlisted pilots.

The planes in service today, compared to the aircraft in use before and even during the World War are well over a hundred miles faster, their reliability and design have be-

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After a hiatus following disasters to earlier craft, the United States Navy is again going ahead with the construction and operation of lighter-than-air craft of the type, though not the size, of the USS Macon, shown at the right over New York City. At an authorized cost of $3,000,000, the new ship will be approximately the size of the USS Los Angeles and will be built in the United States.

Development of Combatant Aviation in the United States Army

by

Major General Frank M. Andrews

Commanding the GHQ Air Force, United States Army

IT is a far cry from the role of the first military airplane to the role of the GHQ Air Force in national defense today.

When the Wright Brothers in 1908 turned over to the Army the first airplane built to military specifications, this first "flying machine," as it was called, was viewed only as a means of increasing the scope of ground reconnaissance. This was its role for six years, and would probably have remained its role for many years to come had not a major war intervened. But along came the World War, and within three months the airplane was developed into a deadly instrument of war, capable of delivering its fire far beyond the range of any previous weapon. One of the teachings of history—that it takes a major war to develop a new weapon—was again confirmed.

From the fast single-seater airplane employed during the World War against other airplanes in the air was evolved our present pursuit type of combatant aviation. From the large, cumbersome, and slow "night" bomber was evolved our present bombardment type. From the smaller, faster, "day" bomber came our present attack type.

Truly remarkable has been the development made in these weapons since the World War. Speed, climb, range, load, reliability—all have been multiplied many times. Throughout the history of aeronautical development, the requirements of the military combatant airplane have been the constant and insistent urge behind the steady progress in design and performance. Military airmen have pioneered in the mastery of the air. In our own Army we have led the way in many phases of aviation—night flying and lighting of airdromes; weather reporting service; refueling in the air; radio communication between ground and airplane; aerial photographic surveying; "blind" or instrument flying and radio ranges; the first transcontinental flight, dawn to dusk flight, flight from the mainland to Hawaii, flight around the world, and recently, Miami to Lima nonstop—all of these have contributed to the development of combatant and commercial aviation.

We have seen the all-purpose single-seater pursuit plane of Rickenbacker's day develop into "interceptors" capable of climbing to 15,000 feet in 6 minutes, with 8 machine guns mounted in the wings; into two-place "protectors" of considerable range; into two-engined "fighters" bristling with cannons and machine guns.

While observation aviation for front line work has not undergone fundamental changes, a new type of observation, designated as "reconnaissance aviation" has been organized for the long range requirements of the GHQ Air Force. Attack aviation, whose low flying mission during the World War was performed by any and all airplanes available to a commander, has been provided with a varying assortment of airplanes during the past twenty years. The fast, single-engined airplane has predominated but both fast two-engined types and slower armoured types have been tried. If low flying tactics are to be continued some armour seems necessary even if sufficient only to give protection to the crew and the fuel tanks. The next few years will probably see radical changes in this type.

Bombardment aviation has undergone the greatest change of any type in existence at the close of the World War. More than any other it has profited by the advances made in airplane design and performance, in aids to navigation, in bomb sights, in weather forecasting and instrument flying. Its capabilities bear little resemblance to those of the Caproni or the Handley Page of wartime fame. Developments of the past year indicate that the era of the really large, high performance airplane is not far off. When that era dawns, we can no longer sit back and view with complaisance the broad expanses of water guarding our coasts.

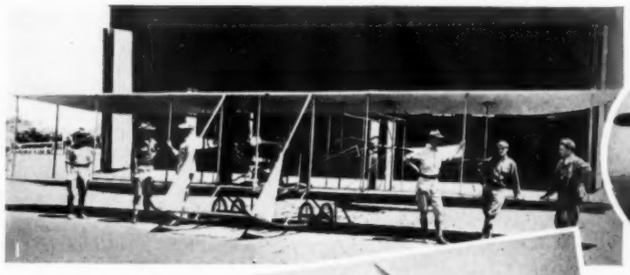
Aside from scientific development, our combatant aviation has benefited from improved organization and control. For many years, the tactical air units were under the jurisdiction of the Corps Area commanders, which meant that unity of command, coordination of training and uniformity of tactics were impossible. Upon the recommendations of the Baker committee the War Department organized all combatant aviation in this country in March 1935 under a single command. This unit was christened the GHQ Air Force and placed under the direct control of the Chief of Staff. It consisted of three wings, comprising a total of nine groups: four bombardment, three pursuit and two attack and a number of long range reconnaissance squadrons. The mission assigned this new unit was fourfold— to be prepared to perform long-range strategic missions independent of ground or naval action, to support the action of ground forces, and naval forces, and to operate in defense of the coasts. High mobility was to be the objective of organization and training.

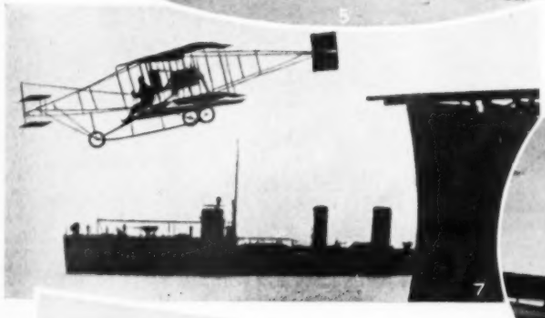
During the past three and one-half years, definite headway has been made in carrying out these missions. Units have been re-equipped with modern airplanes; the training of tactical units has improved tremendously; combat crews have been organized; pilots are now proficient in instrument and night flying; bombardment and reconnaissance units are better supplied with qualified celestial and dead reckoning navigators. Gunnery and bombing is much more efficient. It should be noted, however, that in general tactical units of the GHQ Air Force are still operating on a skeletonized basis of approximately one-third effective strength.

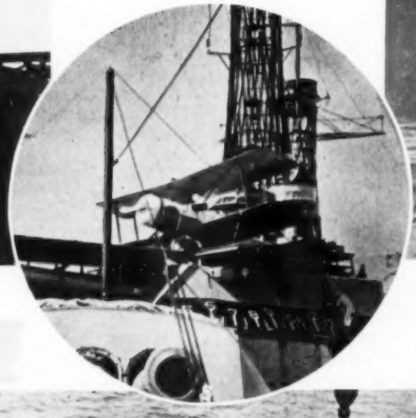
Modern air operations, involving as they do highly technical equipment, high speed, great altitudes, and all kinds of weather require that pilots, navigators and bombers achieve a state of training far beyond that required only a few years ago. It has made imperative the rigid adherence to the "combat team" system of training and operations; that is, a regularly assigned crew for each airplane. It is for this reason that it has been found necessary to augment the present system of placing reserve officers on temporary active duty by a policy of substantially increasing yearly the number of these reserve officers tendered commissions in the Regular Army. Because of the difficulty of mastering the intricacies of the modern airplane and the scientific aids to aviation it now takes from two to three years to train properly a military pilot. A modern air force is an expensive outlay, representing a considerable percentage of the national defense budget. In an emergency it should deliver the maximum possible return on the taxpayer's investment. Efficiency at the beginning of hostilities is the measure of its capability. Stability of personnel is the prerequisite of efficiency. In the interests of economy as well as of readiness, it is apparent that the proposal of the War Department to commission in the Regular Army each year a sufficient number of graduates of the Air Corps Training Center to maintain stability of personnel in all units is unquestionably sound.

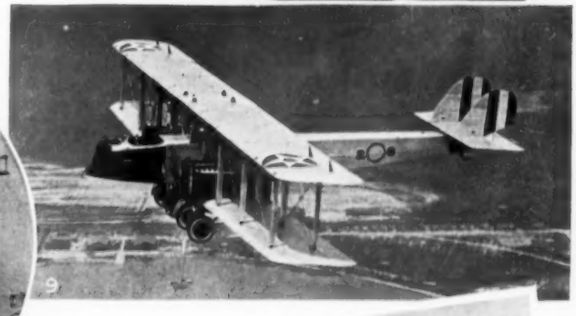
We must divorce from our minds the idea that the GHQ Air Force in times of peace can be a "nucleus" for wartime expansion. It is no longer possible to suddenly expand an air force in an emergency by calling in all of the commercial and private airplanes for war service. Years, not months, are required to train a military pilot; years, not months, are required to equip units with "drawing-board" airplanes. The GHQ Air Force, like the Navy, must be in constant readiness. Its effectiveness lies in what it can do tomorrow morning with the equipment and personnel of today.

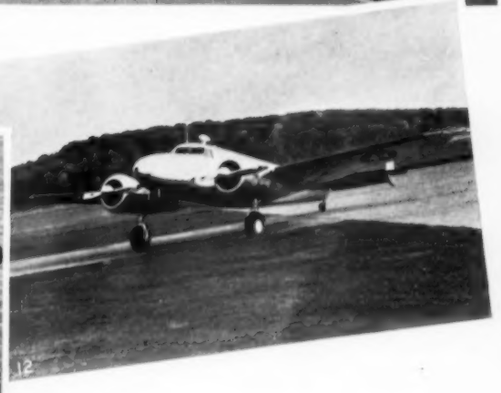
WINGS FOR THE ARMY AND NAVY











The Army's first plane was a Wright, type B. In the photo above (1) the pilot, Lt. B. D. Foulois, is the second from the right. By 1924 the Fokker CO 4 (2) had come in, followed in 1928 by the Douglas XA-2 (3). In modern types, the Army flies the huge Bomber B-17 (4), manufactured by the Boeing Company; the Curtiss (5) and the Lockheed XC35 substratosphere plane (6).

The Navy in 1910 made the first flight from the deck of a ship, the USS Birmingham (7). A little later turret platforms were providing run-ways such as the Vought plane (8) is shown resting on the USS Oklahoma. A 1924 model Martin bomber (9) showed greater size, while large flying boats such as the Boeing patrol boat of 1925 (10) came in vogue. A Vought observation plane of 1928 (11) is shown ready to be hoisted aboard. A Lockheed utility plane which transports 12 passengers is shown in No. 12.

Industrial Preparedness Looks Ahead

by

Brigadier General Benedict Crowell, O. R. C.

The Assistant Secretary of War 1917-1921
President, Army Ordnance Association

IT is a particular pleasure to comply with Colonel O'Laughlin's invitation to contribute to this historic number of the ARMY AND NAVY JOURNAL. I well recall that the JOURNAL was most active and considerate twenty years ago when those of us who were directing the military war-time effort needed accurate service reporting. Our military progress in the United States has in the JOURNAL a chronicle of three-quarters of a century.

The JOURNAL has narrated week by week with flawless precision the various stages in the development of industrial preparedness in the United States. Because I have had some part in that development I propose here to present a summary of what the JOURNAL has recorded during the past two decades. And I shall hazard a forecast.

While the years have witnessed many changes in the attitudes and theories of national defense, none is more significant than the coordination of our great industrial strength to the needs of our defense services in time of war. This coordination is what we call industrial preparedness and it augurs more for our national security than any other one element of our coordinated defense policy. Twenty years ago we bemoaned the fact that we could raise our armies of men, train, house, feed, clothe and keep them in good health twice or even three times as fast as we could equip them with implements of defense. Today—thanks to the realization of what industrial preparedness means—this ratio has been materially reduced. And our defense potential, in consequence, is greater today than it has ever been during the entire life of the ARMY AND NAVY JOURNAL and through all the years of our nationhood.

If we analyze the glaring deficiencies which were apparent to everyone after the World War was over, it is clear that the two most serious shortcomings were our lack of trained officers and our untrained industrial power. When the National Defense Act of 1920 was written there were a few of us who determined that these disparities must be corrected and that authority for so doing must be, for all time, in the organic law of the land. The National Defense Act then became, as it is today, our basic charter for the coordination of man power and munitions power. The Act is adaptable, under whatever form our international policy may be, to meet our defense needs. Whatever changes the coming years may bring, the National Defense Act in its present broad policies should remain, else the pitfalls of our World War experience will remain in the path of our military defense.

As I look back over the past twenty years I can visualize no time at which the Army of the United States was in as high a state of efficiency as it is today. For this we can congratulate and thank first and foremost the President of the United States, than whom neither the Navy nor the Army has ever had a more consistent advocate. The record confirms this estimate looked at objectively and disinterestedly. The Congress too has responded in goodly measure to this leadership and the War Department in both its military and industrial relationships is performing its great task with dispatch and fairness to the professional and civilian elements of the Army and to industry.

By a coincidence, as these lines are written the climax of nearly twenty years has been reached in the authorization of educational orders for munitions production. Thumb the pages of the JOURNAL and you will find in issue after issue the plea of disinterested patriotic citizens, of Secretaries and Assistant Secretaries of War, of officers of the various components, of engineers and scientists and leaders of private industry, all pleading for the opportunity to train private industry in munitions production. Their petition had in mind peace-time training for war-time service. They sought to reduce the delay at the beginning of a war when ignorance is as costly as defeat. And now educational orders have been authorized. It seems to be a providential climax brought about at the end of twenty years of striving.

Thus the year which marks the JOURNAL'S seventy-fifth anniversary is the twentieth year after the ending of the World War. During those past twenty years more progress has been made in the peace-time training of our man power and the peace-time training of our munitions power than ever before. But our vision, while not unmindful of the past, must be turned to the future. The era of industrial mechanization has already brought about tremendous changes in the life and habits of people. Whenever a national emergency comes it will demand the new things and not the old. Thus the airplane and the tank appear to be the mobile fortresses—whether large or small—which will bring back mobility to the battlefield. Similarly, the new machines are not weapons at all until they are adequately equipped with ordnance, so that the future portends increased demands in time of war. And as the demand for equipment will increase in battle, the demand for men will decrease. The striking thing in modern defense is the tremendously growing power available to an individual soldier. His mobility on land has jumped from 5 miles an hour to 55 miles; his mobility aloft has increased from zero to more than 250 miles an hour; his fire-power, by virtue of automatic weapons, has risen considerably. The best example, I think, of the effect these modern inventions are having on warfare is the probability that infantry divisions of the future will be less than one-half the size of those of the World War yet the striking power, the mobility and the defense of the unit are at least equal to the old and in many respects considerably greater and more powerful.

Whatever changes the future may bring, two basic principles are certainties among us. The first is that our man power is adequate and the second, our industrial power is the greatest in the world. These must continue to be coordinated, trained and equipped. Judged by the progress made during the past twenty years, the future should hold no fears for us. But the interest, loyalty and zeal of all good citizens, whether in the military service or out of it, will still be required. And the ARMY AND NAVY JOURNAL will continue, I am sure, to lend a helping hand.

Ordnance and Industrial Progress

Stimulation to Metallurgical Industries; Complex Equipment—Optical Fire Control, Tanks; Problem of Conformity to Commercial Standards

by

Major General Charles M. Wesson

Chief of Ordnance, United States Army

THE early developments of the steel industry were greatly stimulated by the demands of the Army for steel guns, armor and armor piercing projectiles. First was the requirement for a good carbon steel and later for low alloy steels. Ordnance quality steel became an industrial term symbolic of these developments. With the rise of the automotive and the chemical industries the Department's role in the metallurgical industry has become relatively unimportant. The industrial requirements for good quality steels are now such that the Department has little difficulty in meeting its need from available sources.

It has been a tradition in the Department to carry on research activities. The more important contributions have been grouped around the construction of cannon. General Rodman's experiments during the Civil War in developing methods of casting iron cannon are still classical. The work of Watertown Arsenal in studying the properties of metals by tension tests and later by the introduction of new concepts of impact testing are known to engineers. Recent developments in the field of centrifugal casting and cold working of guns and the development of molybdenum high speed tool steel have been applied in industrial products.

With the advance of the industrial arts the Ordnance problem becomes more complex. Ordnance matériel consist no longer of simple mechanisms. It incorporates the many mechanical developments especially of the past two generations. Not only is the individual piece more complicated, but many new categories have been added to the equipment of the Army—matériel which was formerly undreamed of. To mention only a few — the optical fire control instrument, tanks, and airplanes. Under the pressure of national competition the variety of equipment introduced into the Army is constantly increasing.

The quantity of mechanical equipment for any army has increased in proportions similar to that used by industry, and is still increasing. Likewise, modern armies are capable of enormously increased expenditures of ammunition.

In considering the relation of the Ordnance Department to industry, there are some factors which might be given some thought.

Ordnance matériel is non-productive in character. This is a most important distinction between military and industrial equipment as far as the Ordnance problem is concerned. The use of the matériel does not provide income from which to amortize the cost of the investment or to provide profits from which new developments might be financed. The economic nature of military equipment has led to the emphasis of certain characteristics of design such as durability and reliability and has as a consequence a marked influence on progress of development by slowing down the rate of obsolescence. These factors tend toward conservatism in engineering and in time of peace in lessening the demands for new types of equipment.

Another difference between military and industrial problems is a marked difference in minimum and maximum production requirements. The peaks and valleys of the industrial cycle of military equipment far exceed those for any other type product. The normal peace-time demands are readily met in this country by a comparatively small number of plants; whereas, war activity requires the mobilization of practically all industrial plants in the country, some of which are inexperienced not only in the production of the article required but in the quality of the workmanship demanded.

Upon the outbreak of war certain factors are bound to operate which must be considered in studying the relation of the Ordnance Department to industry. Of course, the immediate demand is for matériel for the equipment of newly raised armies, and for ammunition and supplies to maintain the fighting forces. In this demand the time factor is of the utmost importance. It takes longer to produce equipment for a modern army than it does to train men. It is a first principle that the organization of the Department and its relation to industry in time of peace be such that the time required to get industrial production be the minimum.

It is not to be expected, however, that either the fighting service or the public will long remain satisfied with its Ordnance equipment. Troops are in actual combat and become familiar with the characteristics of enemy matériel. They find differences in matériel which appear to handicap them in their operations or they see possibilities of the use of new types of matériel. Likewise, the engineering and scientific personnel of the country dedicate their energies to developing new weapons of warfare or new accessories for their use. Under this pressure it must be anticipated that there can be no cessation of development work either in the reasearch laboratories or the design engineering offices.

With the undertaking of production of Ordnance in industrial plants the production engineers will find many ways in which a product might be modified to better fit their facilities for manufacture. However such action be anticipated the problem of production engineering is a difficult one for the Department because of the small peace-time manufacturing programs.

An analysis of these factors that influences peace-time and war-time activities points clearly to the necessity of close intimate contact between the Ordnance Department and National industry. Our peace-time programs are too limited to permit us to purchase industrial cooperation. Of course, industrial designs are used where applicable, but for the most part because industry covers but little of the munitions industry, the responsibility of design of Ordnance matériel rests solely upon the Ordnance Department.

Even omitting all considerations of economy, the necessity of reducing to the minimum the time of building up industrial production in time of war makes it essential that the Ordnance Department follow and apply the development of industry to Ordnance matériel and the methods of its production. Particularly the developments of industrial laboratories in providing new materials and processes of manufacture and the refinement of processes through the development of more exact control must be incorporated in Ordnance practice. The De-

(*Continued on page* 117)

The Chaplaincy of the Armed Forces

by

Colonel William R. Arnold

Chief of Chaplains, United States Army

WHEN the ARMY AND NAVY JOURNAL was just beginning the long period of brilliant service now climaxed by its Diamond Jubilee celebration, the chaplains had already completed seventy-five years of service in the ARMY.

The first Army of the United States with its 2232 officers and men had one chaplain. As the armed forces of the country increased there were in successive periods four, eight, sixteen, twenty, and thirty chaplains. During the Mexican and Civil Wars each regiment and general hospital had its own chaplain. However, many of these chaplains, as those in later wars, served only during the period of conflict, and the peace-time Army has always lacked enough regular chaplains to serve all posts and stations.

For many years up to 1917 the number of commissioned chaplains remained stationary at sixty-six. Then came our entrance into the World War, and, (of the large number of clergymen who eagerly offered their services, 2364 were trained, commissioned and assigned to active duty with troops, in hospitals and on transports. Of this number five were killed in action, six died of wounds, twelve died of disease or accidents, and twenty-seven were wounded. For courageous service five chaplains were awarded the Distinguished Service Medal, twenty-three were awarded the Distinguished Service Cross, and fifty-seven were decorated by foreign governments. The heroic example of St. Paul and the other Apostles bore rich fruit in the lives of these courageous and self-sacrificing chaplains. "He that loseth his life for My sake shall find it."

No matter where men may be or what their occupation, they owe God a debt of worship and they need the help and comfort of religion. God opens His arms and speaks alike to rich and poor, to the wise and the foolish, to the saint and the sinner—yea, to the soldier as well as the civilian. And ordinarily He clothes His message in human words and calls on human action to give it form and substance. He sent His only Son into this world to show us "the Way, and the Truth, and the Life" in the conditions and circumstances of our daily living. And the Son said to others whom He selected and trained "As the Father hath sent me I also send you." Who knows better than the Army both the necessity and the responsibility of delegated authority and power. Who, more than the chaplain, labors with skill, perseverance and devotion to accomplish the purpose for which he was ordained and commissioned by Divine and human authority. He is happier, as he is more efficient, under two coordinating authorities and two supplementary disciplines.

Like the Army itself, the peace-time and war-time services of the chaplains will soon be one hundred and fifty years old, and our congratulations to the JOURNAL are weighted with the deep, rich wisdom of our mellow age, and a large share of the spiritual blessings committed to our ministration.

by

Captain R. D. Workman, (Ch.C.), U.S. Navy

Head, Chaplains' Division, Bureau of Navigation

THE Chaplains of the Navy extend felicitations and best wishes to the ARMY AND NAVY JOURNAL on the occasion of the celebration of the seventy-fifth anniversary of the founding of this widely known service publication.

The seventy-five years of splendid service rendered by the ARMY AND NAVY JOURNAL have seen marked changes in the Chaplain Corps of the Navy. In 1863 there were eighteen Chaplains on active duty, only five of whom were serving at that time at sea, according to the Register, in steam sloops and in steam frigates. The Regulations for the Government of the Navy, dated April 18, 1865, designate Chaplains as Staff Officers,—to be given the rank of Commander after twelve years' service, and to be exempt from professional examination upon appointment. Article 227 of those Regulations specify that the Chaplain must be "a regularly ordained minister of some religious denomination and of unimpeachable character." If one may judge from the pictures of the Chaplains who served in the Navy in that Victorian Day, stern-featured, long-whiskered gentlemen, the "Holy Joes" of the sixties must have been veritable giants in the fields of scholarship and theology.

For many years the strength of the Chaplain Corps never exceeded twenty-four. In 1914 the grade of Acting Chaplain was established and the authorized strength of the Corps set at one Chaplain or Acting Chaplain for each 1250 of the personnel. The World War expansion of the naval service, 1917-1918, carried the Chaplain Corps to a new high strength of twenty-six Chaplains and one hundred and forty-one Acting Chaplains. Peace adjustments brought the strength down to eighty-one in 1921, which remained the approximate average strength of the Corps until 1937. At present the Chaplain Corps has a strength of eighty-nine, made up denominationally as follows: Baptist 14; Congregational 3; Christian 2; Catholic 17; Disciples 4; Episcopal 7; Lutheran 9; Methodist 16; Presbyterian 15; and Reformed 2.

Of this number eight serve ashore beyond the continental limits of the United States; Coco Solo, Canal Zone; Guantanamo, Cuba; Naval Station, Hawaii; American Samoa; Guam; Naval Station, Cavite, Philippine Islands; and Shanghai, China. Three Chaplains are serving in ships on the Asiatic Station and forty serve in ships in waters adjacent to the United States. At Navy Yards, Training Stations and other posts within the continental limits of the United States thirty-eight Chaplains are on duty.

Fifty-eight Reserve Chaplains are members of the Naval Reserves: 9 Catholic, 2 Jewish, 47 Protestant.

Twenty-two Chaplains are on the retired list of the Navy.

No higher privilege is granted to clergymen anywhere than that which has been bestowed upon these men of the Chaplain Corps of the United States, each of whom bears two commissions—one from his country, and one from his Church—entitling him to carry the benefits of religion to the splendid officers and men who serve their country in the United States Navy.

"All the world knows that Stonewall Jackson struck harder blows, because he prayed so much.

"Rosecrans, a devout Roman Catholic, just before his designed attack on Chattanooga, had masses said in all the churches of Cincinnati for the success of his arms.

"And so it must always be: Before going into battle the foolish, wicked, unmeaning oath is silent; with the bracing of the nerves, there goes up a silent prayer for strength and valor and deliverance.

"On the battlefield of Gettysburg were found, broad-strewn, Bibles and prayer-books. Carried in coat bosoms, or pockets, they came forth in the bitter moment, a solace to the wounded and dying, and a proof that soldiers pray as well as fight. All honor and thanks to the worthy chaplains who foster this noble spirit, and to the philanthropic men who care for the soldier's interests at home, taking with them, in timely visits to the battle-fields, and in crowded hospitals, comforts for the poor suffering mortal bodies, and holy books and words of prayer for the well-being of the immortal souls."

—*From the Army and Navy Journal of September* 19, 1863.

Development of American Field Artillery

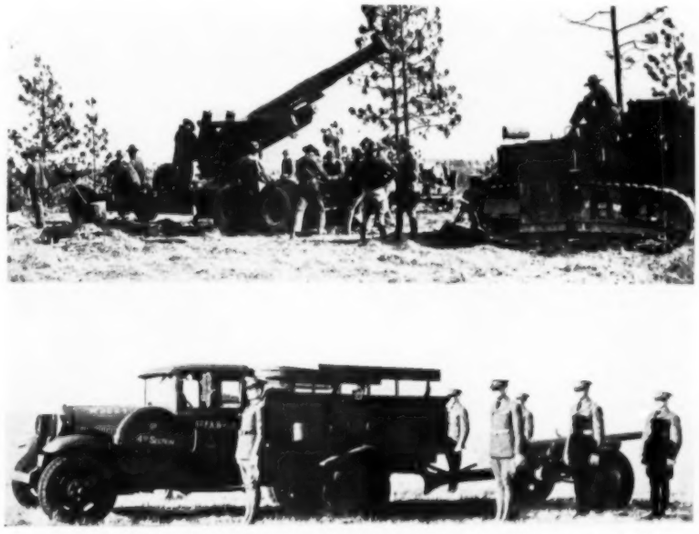
by

Major General R. M. Danford

Chief of Field Artillery, United States Army

THE field artillery record of the last seventy-five years is one of an astonishing progress: almost, might it be said that during this period lies all the development of field artillery save that basic step taken by Gustavus Adolphus, about 1600 AD, when addition of the wheel to the gun carriage gave to cannon battlefield mobility, thus marking the birth of the arm. The story of this progress is that of the search for increasing power in fire support of front line elements, both in attack and defense. This need has been the motivating force behind development.

Seventy-five years ago weapons of the arm were only just beginning to emerge from the smooth bore muzzle-loader types which had been characteristic of cannon for centuries, and their employment involved simply their emplacement for direct fire upon targets at short range. The problems of the field artillerymen were those of horse transport, the niceties of firing his weapon in direct fire, the close defense of his guns, and the administration and care of his command and equipment: types of weapons differed little, a high degree of technical training was not required. That these problems were not onerous is not implied, under the conditions of warfare then existing, but that they were not complex, in the light of the present, is evident.



Motorized Field Artillery. Above, tractor-drawn; lower, drawn by light commercial truck.

The turn of the century marked a critical point on the curve of field artillery development, for during this period weapon designers produced the recoil mechanisms and ammunition which led to the quick firing, long range field piece types of the present day. These developments so enhanced the potential power of field artillery in all of its characteristics that attention centered energetically upon development of the means for its most profitable employment. From this period begins a record of increasing complexity of equipment, organization and operation which eventually so broadened the field of artillery activity, and the necessary technical qualifications of personnel of the arm, that two of the roles of cannon in warfare, (coast defense and anti-aircraft), have been charged to an entirely separate arm.

Tactical doctrine immediately underwent radical change. Smokeless powder permitted effective concealment of the guns, and from this factor, in combination with available increased range, more effective projectiles, and greater flexibility of fire, there evolved the present practices of emplacement in concealed positions, well within the friendly lines, from which support could be rendered over wider fronts and with less chance of interruption from shallow penetrations by the enemy.

Such changes introduced the field artilleryman to the intricacies of laying his guns upon targets which were hidden from the firing positions, of adjustment and direction of fire from points at long distances from the guns, of developing the flexibility which permits the concentration of fire power at any point within range at the will of the high commander, and, last but not least, the difficult field of communications—the last named, not alone needed between observation post and guns but also between command posts and forward to the front lines.

These problems are still with us; not, of course, in the simple forms in which they first appeared but in exceeding complexity resulting from changes in tactics of the supported arms, and from the multiplicity of types of field artillery weapons, each designed for high performance of a special mission and having innate problems to be met in carrying out its tactical role.

* * *

During the World War there appeared many new tools of warfare and many new applications of old ones. As affecting field artillery the three most important were the automobile, the radio, and the airplane.

Automotive transport marks progress, but has introduced great complexities into the field of transport, and I feel that it is no overstatement to assess its effect as having quadrupled our problems, for we have now not only two types of transport but, for the same caliber in many instances, two types of weapons and two types of organizations, with attendant differences in their tactical employment and all the small details of their administration. This is no small matter, for the field artilleryman, who a short while ago had but to be a horseman, must now be versed in the handling of both the horse and the motor—since retention of an expandable nucleus of horse-drawn artillery, in addition to the horse artillery of cavalry divisions, is necessary.

The radio, like the automobile, does not replace an old tool, but is in addition to the older established wire means of communication. Its use, like the automobile, requires of the field artilleryman special technical knowledge. The investigation still continues as to the extent to which radio may be applied to field artillery purposes with profit, certain it is that some use of it is here to stay, though the difficulties it introduces are cogent reasons for reduction of its use where vital needs are not served by it.

The military use of the airplane affects the field artillery primarily through its providing otherwise unavailable elevated observation for the adjustment of fire and for the location of targets. There are few complexities which result from this application of a new tool, but it is to be noted that its use enhances beyond measure the effectiveness of our weapons against the enemy. Use of the airplane by the enemy has, of course, introduced complications in the matter of effective concealment of positions and of troops on the march, and in the matter of defense against actual attack by planes.

The arm emerged from the World War with these three new tools already partially adapted to its purposes. Progress since the war has been the story of searching for greater efficiency in their adaptation, and the adaptation of other tools, less far reaching in their effect, in order to answer the ever increasing demand for greater power—greater range, greater flexibility, greater effect from the projectile, greater speed in fire and movement—greater and greater efficiency in all things and all their details.

* * *

Of note during the past seventy-five years is the cycle of change observable in the field artilleryman himself. Up until the World War he was a sort of general purpose field artillery soldier, his field of endeavor not large and his specialization (*Continued on page* 118)

Purchase, Storage and Issue of Naval Material

by

Rear Admiral Charles Conard, (S.C.), U. S. Navy

Paymaster General of the Navy

THE methods of procurement, systems of storage and issue of Naval material during the past 75 years have changed as better business procedures have been developed, and as the exigencies of the service have required a more efficient administration of the function of supply. The evolution of the Naval Force of the Civil War period to the present modern fleet, with its variety of armed branches, has, through the development of mechanical propulsion, the improvements in ship architecture, tremendous changes in ordnance material, followed by the development of the submarine and airplane, increased the demand for a greater variety of materials and items of supply. These mechanical, engineering and ordnance improvements not only created the demand for an almost infinite variety of materials and supplies for shipbuilding, but also required well distributed and judiciously stocked bases for supply and maintenance, and a business-like system to procure effectively all these items and to account for their use in a manner which would reflect efficient operation. The progressive steps in the development of the conduct of the business functions of the Navy is the history of the Supply Corps which is charged with the general administrative work of supply, accounting and disbursing.

The business branch of the Navy is now the Bureau of Supplies and Accounts. From the close of the Civil War until 1885, it was known as the Bureau of Provisions and Clothing. This bureau, along with four others, acted independently in matters of supply, each making its own contracts for materials under its cognizance, receiving, storing and issuing them, and in general conducting its own business without any attempt toward coordination with similar activities of other bureaus.

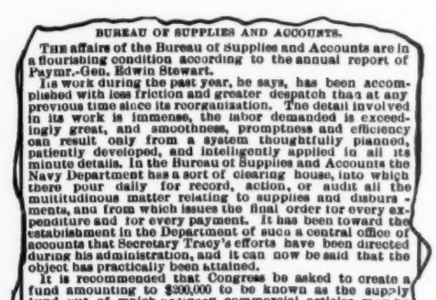
In 1885, after an intensive investigation and study, the custody and records of all stores pertaining to the Navy, except those of the Bureau of Medicine and Surgery and the Marine Corps, was transferred to the Bureau of Provisions and Clothing.

In 1889, Congress further provided for the maintenance in the Bureau of Provisions and Clothing of all property accounts of supplies pertaining to the Naval establishment, for the rendering of an annual report to Congress and for transfer between bureaus without reimbursement of supplies bought in prior fiscal years. During the succeeding two years (1890 and 1891), it was provided that all supplies purchased with moneys appropriated for any branch of the Naval Establishment was deemed to be purchased for the Navy and not for any specific bureau, and that these supplies should be arranged, classified, consolidated, catalogued and issued for consumption or use without regard to the bureau for which they were purchased.

This was centralization of the most efficient type. It made the term "Provisions and Clothing" incomplete, and in 1892 this branch of the Navy became the Bureau of Supplies and Accounts. It continues with its old functions concerning food and clothing for the enlisted men, and is also concerned with all that relates to the purchase, reception, storage, care, custody, transfer, shipment, issue and accounting for all supplies and property of the Naval Establishment, except medical supplies (but including their purchase) and supplies for the Marine Corps. It is also directly in charge of all fuel for Navy use, and of the chartering of merchant vessels, the loading of supply ships and the operation of fueling plants.

In 1878, an Act of Congress established the "General Account of Advances," an intermediate account which permitted disbursing officers on ships and foreign stations to pay bills from one general fund, the necessary accounting adjustment of appropriations being made in the Bureau of Provisions and Clothing. This system was so satisfactory that it was adopted for the entire naval service afloat and ashore in 1908.

Another significant step in the growing demand for a more efficient administration of supply work was the institution of the "Naval Supply Account Fund." After the establishment of the Bureau of Supplies and Accounts, with its increased scope of usefulness, in 1892 some difficulties were encountered in controlling the issue and use of supplies. The system in effect prior to that date was cumbersome and ineffectual, business transactions within the Navy being hampered by unsatisfactory accounting procedures. After some years, a system was evolved which eliminated the current difficulties, and by congressional action this revolving fund was established. Under this system, all supplies are paid for from this fund, taken into store, and when issued for consumption or issue, their value is charged to the specific appropriation concerned. A variation from this system was made by the establishment of the "Appropriations Purchases Account" which, as its name implies, embraces supplies purchased directly under various appropriations.



BUREAU OF SUPPLIES AND ACCOUNTS.

The affairs of the Bureau of Supplies and Accounts are in a flourishing condition according to the annual report of Paymr.-Gen. Edwin Stewart.

Its work during the past year, he says, has been accomplished with less friction and greater despatch than at any previous time since its reorganization. The detail involved in its work is immense, the labor demanded is exceedingly great, and smoothness, promptness and efficiency can result only from a system thoughtfully planned, patiently developed, and intelligently applied to all its minute details. In the Bureau of Supplies and Accounts the Navy Department has a sort of clearing house, into which there pour daily for record, action, or audit all the multitudinous matter relating to supplies and disbursements, and from which issues the final order for every expenditure and for every payment. It has been toward the establishment in the Department of such a central office of accounts that Secretary Tracy's efforts have been directed during his administration, and it can now be said that the object has practically been attained.

It is recommended that Congress be asked to create a fund amounting to $200,000 to be known as the supply fund, out of which ordinary commercial articles may be purchased on requisitions originated by general storekeepers and approved by the Paymaster-General, and thus avoid delay in the issue of these articles.

The Bureau of Supplies and Accounts becomes a centralized clearing house for supplies and disbursements. From the ARMY AND NAVY JOURNAL of November 26, 1892.

The law of 1890 provided among other things that the supplies on hand should be catalogued. As soon as possible thereafter, this was accomplished by the issuance of a classified index wherein were listed the names of the articles carried, alphabetically arranged, the class to which each pertained, the bureau or bureaus interested, or charge account to which it was intended to be issued. This procedure fulfilled the cataloguing mandate of the law and was followed for twenty years. However, it was felt that this arrangement was insufficient, and there was subsequently developed the Navy Standard Stock Catalogue, the forerunner of the Federal Standard Stock Catalogue, which is in use by the Government services generally.

The development of accounting systems and methods, particularly in cost accounting, followed the general business trend for more specific accounting data concerning building, repair and maintenance costs. Many modifications have been incorporated since the establishment of a general accounting system, but the fundamental principles have been adhered to.

The Navy purchasing system is also the product of evolution. The present system is super-imposed on the foundation created in 1886 and under this system the Bureau is the general purchasing agency of the Navy.

In a study of any form of Government purchasing as compared with commercial practice there must be borne in mind one inherent difference. The Federal laws impose restrictions and prescribe forms which restrict this class of procurement from the freedom of action which, to some degree, is enjoyed in all forms of commercial purchasing. These laws have the dual purpose of protecting the interests of the Government and assuring equal opportunity to all legitimate and responsible suppliers.

The Navy purchasing agency is accordingly bound by law and regulations which limit to some extent the scope of activity. Through the years, the Navy has been able to follow all the requirements of legal directives and yet produce a system which insures its business being transacted in such a manner as to be favorably commended and copied by commercial organizations. The steps in transition during all these years have followed procedures and systems which have effectively insured a competent business organization.

Industrial Chemistry — A Bulwark for Defense

by

Major General Walter C. Baker

Chief of the Chemical Warfare Service, United States Army

THE resources of modern industrial chemistry provide much in the way of powerful implementation for armed forces. It is today clearly recognized that the potentialities of a flourishing synthetic organic chemical industry must be counted along with trained battalions in estimating the military strength of any nation.

This was true only in a limited degree in the days when the ARMY AND NAVY JOURNAL first began publication. Even until the time of the World War chemistry, although an essential, was nevertheless but an indirect contributor to programs of armament. While certain chemical substances were known to be capable of directly incapacitating soldiers, chemical industry had not been able to produce these compounds in measurable quantity and their use in battle was therefore not seriously considered.

The advent in 1915 of the chemical agent as a factor in military operations was, as it happens, coincident with the rise of our national chemical industry to the commanding position it now enjoys in the economic life of the United States.

Prior to the commencement of the World War, the entire world looked to Germany for leadership in both chemical research and chemical production. When this source of supply was suddenly shut off in August, 1914, the United States was obliged either to develop its own chemical resources or else do without innumerable materials regarded as indispensable to normal life. Obviously, America chose the former course. Thrown wholly on its own resources, the chemical industry moved steadily forward until today it is one of the basic industries of the Nation, its importance being reflected not only in the capital and labor for which it affords employment, but also by reason of its basic and essential contribution to every other field of industry.

Protective chemical warfare. Upper, laying a smoke screen. Lower, degassing a field (note protective clothing developed by Chemical Warfare Service).

Had the United States been thrown into the World War at its outset, our then meagre chemical resources would have been proven inadequate for the support of gas warfare as it later evolved. However, the rapid progress which we were able to make during the years 1915, 1916 and 1917, in developing experienced research scientists, plant technologists, and in the construction and operation of chemical manufacturing facilities, enabled the United States to embark on a first-rate program of gas warfare which there is every reason to suppose would have produced telling effect had the World War continued through the spring and summer of 1919.

It may thus be concluded that the development of our modern chemical industry within the United States, and the growth of the Chemical Warfare Service, are both rooted in circumstances arising out of the World War. Our present independence, if not supremacy, in the field of industrial chemistry can be traced directly to the shutting off of imports when the British Navy closed the seas to German commerce. Our Chemical Warfare Service was shortly thereafter called into existence to meet new methods of combat initiated during the World War, and relied for its success largely but not wholly on the important asset to our commercial life represented by your embrasive chemical industry.

The mere fact that such an industry exists, however, is not sufficient. There must be an agency to translate this military potential into successful military action. This, in a word, is the mission of the Chemical Warfare Service. This branch of the Military Establishment undertakes, through its various agencies, to apply chemical science to war, drawing on research scientists, production specialists, manufacturing plants, and even directly on our natural resources, to provide our Army and Navy with the chemical matériel required for modern warfare by keeping our protective equipment and measures ahead of the offensive means of other nations.

Thus the chemical industry has come to regard the Chemical Warfare Service as the military agency through which it can make its direct and important contribution to the national defense. Young men entering the chemical industry from important technical schools logically turn to the Chemical Warfare Service Reserve as a medium for satisfying their military proclivities, while the American Chemical Society, one of the largest and most important professional groups of its kind in existence, constantly makes available to the research agencies of the Chemical Warfare Service its knowledge and experience in this field of science.

As a result of the close cooperation that has existed for many years between the Chemical Warfare Service and chemical industry, by

(*Continued on page* 120)

(From the London Mechanics' Magazine.)

GREEK FIRE.

JUDGING from the outcry which has been raised against General GILLMORE by certain partizans of the "so-called Confederate States" for the use of shells which contained "Greek fire," one would think that nothing had been done in this country to patent and perfect such instruments of destruction. It so happens, however, that the Americans are only following our teachings in this particular. Readers of the *Mechanic's Magazine* have, for years past, been made familiar with inventions having for their object instantaneous and unmitigated destruction. We do not know of what "Greek fire" is composed, neither do we know the origin of the phraseology. From certain obscure documents of the Eastern Empire, we suppose the designation "Greek fire" means either a rocket, or a liquid combustible materiel, composition unknown, which, being projected through tubes or in jars, set fire to combustible substances. During the Russian war, Captain DISNEY exhibited at a public meeting certain glass shells, which, when thrown against a hard substance, burst, and, in a few seconds, set fire to all combustible material with which they came in contact. Before this, Captain NORROS had suggested a small-arm incendiary projectile. At one time, scarcely a month passed without a little letter appearing in our columns from the last-named gentleman, describing some "Beelzebub" machine, which had for its object rapid and certain destruction in war. During the Crimean war, Mr. J. MACKINTOSH called the attention of the Government to the extraordinary efficacy of certain projectiles, which he called "liquid fire" shells, and to the application of other fiery materials in warfare. A special committee was appointed to inquire into the whole question, and a series of experiments was tried at Shoeburyness, by which inflammable materials were consumed at the distance of 800 yards. In August, 1855, Mr. MACKINTOSH patented another invention. The following passage occurs in the specification:—

"I fill diaphragm shells with coal-tar naptha, mixed with phosphorus and bisulphuret of carbon, having a bursting charge sufficient to open the shells. When fired, the bursting of these shells scatters the contents in all directions, and the shower of inflammable material, falling among cavalry and troops, ignites spontaneously, causing their immediate disorganization. Fired into shipping, these shells, bursting on deck or below, scatter the inflammable material in all directions, and the spontaneous combustion which arises causes inevitable and irremediable injuries and destruction to the crew, who are unable to escape except by dropping overboard, and the vessel itself is speedily consumed, and from the crew having been rendered impossible, as just described. Fired into dockyards, harbors, or towns, the result is alike destructive and decisive."

The use of such shells may be denounced as inhuman and contrary to the usage of civilized warfare. Is not all warfare uncivilized and barbarous? No doubt the invention of gunpowder and its application to warfare was at one time considered inhuman, as the application of liquid fire is considered by some now. If, however, men will go to war [illegible] and destructive the modes of warfare are

Early Chemical Warfare: Upper, the ARMY AND NAVY JOURNAL, in its issue of October 17, 1863, reprints from a foreign publication, comment on use of "Greek Fire" in the United States. Below, smoke becomes a consideration; from the ARMY AND NAVY JOURNAL of July 4, 1891.

[illegible] one keeping it along the ground.

The tactical employment of smoke will not be confined to the shelter or concealment of troops, it can be used in masking the fire of hostile batteries; in creating false impressions as to the real point of attack, and, most important of all, in enabling ammunition supplies to be carried to the fighting line.

Cavalry will be more benefited by the introduction of some form of smoke shield than infantry will be; in fact, the very employment of the former as a distinctive arm of the Service in line of battle may depend upon the provision for it of some concealment against aimed artillery and infantry fire.

A singular objection raised by some to the use of a special smoke-compound is that gunpowder will produce smoke enough. These gentlemen forget that the introduction of magazine rifles has rendered a greater ammunition supply a necessity; that that has made the reduction of calibre a necessity, and that the reduction of calibre has caused a demand for a new explosive possessed of greater expansive energy in proportion to its bulk than the old powder, and this demand has driven the military chemist into a new class of explosives, of which one feature is that of smokelessness. Gunpowder is doomed; were it not, the need of smoke compounds would not exist. As a smoke compound itself, it is not of value; it is explosive; the

The Development of the United States Infantry

By

Major General G. A. Lynch

Chief of Infantry, United States Army

THE past 75 years have witnessed many changes and additions in the means and mode of combat. The range and rate of fire of all weapons have been greatly increased and now the single-shot rifle is being replaced with the semi-automatic.

With the introduction of each new weapon, whether in his own arm or some other, the infantryman's training problems have grown steadily more difficult. In fact, it is scarcely an exaggeration to say that the intellectual and moral demands made on a battalion commander today closely approximate those made on a general officer during the last century.

But even though our present efficiency be at its all-time high for a period of peace, there are some who still cast a nostalgic eye on the old days when the word "Infantryman" meant only a foot soldier with a rifle. Today the word "Infantryman" has little to do with armament or means of locomotion. It may mean a soldier in a truck, on a motorcycle, in a tank, or in a reconnaissance car. This soldier's weapon may be a rifle, a semi-automatic rifle, an automatic rifle, a heavy machine gun, a 37-mm. gun, an 81-mm. mortar, or the tank. Indeed, as the new agencies and counter-agencies of war multiply, it has become increasingly evident that the true definition of infantry is the arm of close combat and the terms, foot soldier and rifleman, include only one component of the arm.

Nevertheless, it is still the foot soldier—the rifleman — who carries the war into the enemy's ranks and brings about the final decision of battle. It is he above all against whom all the ingenuity of science has been invoked in the creation of new engines of destruction. From the skies, airplanes seek him out to bomb him, machine-gun him, gas him. Far out of sight, quick-firing artillery reaches out to blast him with high explosives and shrapnel. Machine guns are sighted to lay down lanes of death through which he must pass. Areas are sprayed with mustard to burn him; gas clouds are released to choke him to death; smoke to blind him. Tanks lie in wait to catch him in an unguarded moment. How, ask those who look forward, can man endure this? How can the foot soldier survive?

Some of the modern weapons of the United States Infantry. Upper: 81 mm. Stokes-Brandt mortar. Lower: Browning .30 caliber automatic rifle equipped with hinged butt plate and bipod.

Those same questions were asked when powder and ball first appeared on the battlefield. They were reiterated when artillery came into general use. With the introduction of high-explosive and long-range, rapid-fire, artillery they were further emphasized (look over some of the back numbers of the ARMY AND NAVY JOURNAL, and you may find corroboration of this). Indeed, with every great improvement in old weapons and with the introduction of every new weapon some one is on hand to ring the death knell of the foot soldier. But he does survive, and he continues to decide the issue as in the past, and, strange as it may seem, the modern machines of war are no more deadly than the old short sword and spear. At Cannae, in 216 B.C., the total strength of the Roman Army was 79,000. When the victorious Hannibal left the field he had slaughtered 48,000 Romans, or 60%. When, in 1815, Wellington defeated Napoleon at Waterloo the British lost in killed 22% of their Army. When Meade defeated Lee at the battle of Gettysburg, the Union Army lost in killed and missing 8½%, or an average daily loss of about 3%. During the forty-seven days of the Meuse-Argonne offensive the American Army of 896,000 lost in killed and missing 2½%, or an average daily loss of less than one per cent. Though the World War provided the greatest total number of casualties, it is not due primarily to improved armament but rather due to the large numbers involved and the length and intensity of the conflict.

The basic problems confronting the foot soldier have not changed, but they are more complicated and call for increased knowledge and more technical skill, but just as these problems have always been met in the past the Infantry will continue to devise new technique for applying the eternal principles of combat.

The U. S. Army of the '60s

(General Bisbee, the oldest living officer of the United States Army, whose service dates back to his enlistment on September 2, 1861 and who has been a commissioned officer since June 9, 1862, wrote the following as a letter to the Editor of the ARMY AND NAVY JOURNAL.*)*

by **Brigadier General William H. Bisbee**

United States Army, Retired

SALUTATIONS and congratulations to the ARMY AND NAVY JOURNAL on its 75th anniversary, with thanks for your invitation to join the celebration. At 98, in deep appreciation of the privilege, I do so, for the JOURNAL has been my continuous guide, counselor and friend throughout all these years, during which military association great changes have come to us.

In absence of written notes, all must be from memory with brevity, for little can be gained by recitals of dead and gone military methods or odious comparisons with present-day organizations.

In 1861 our standing arm consisted of 19 regiments of Infantry, 6 of Cavalry and 5 of Field Artillery plus the Coast Artillery, the mobile contingent formed into regiments, brigades, divisions, corps and armies by name, as the volunteers increased the forces. Infantry brigades consisted of three regiments with one four gun battery in the center on both march and battle formation. The Cavalry was mainly independent in large or small units, scouting for location of enemy, guarding the flanks, etc. The Signal Corps was called the "Wigwag," their work limited to flagging and the heliograph, no telegraph line, radio or airplanes, no touching a button miles away, as now, to move an army. As spies and scouts reported, marching columns were thrown into battle lines, pickets posted, which if attacked were reinforced by (*Continued on page* 110)

Supplies for the Army

by

Major General Henry Gibbins,

The Quartermaster General, USA

COMMENTING upon the activities of the Quartermaster Corps, an editorial writer recently observed:

"The men behind the men behind the guns are not always thought of in the stress of battle because theirs is not the glamorous mission of leading a charge. Yet their function is none the less vital to the success of any military campaign. He who reads the annals of military history unaware that supply is of the very essence of victory has missed the basic point of both strategy and tactics."

The Constitution of the United States was adopted "to insure domestic tranquillity, provide for the common defense, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity." It was with that purpose in view that the Army came into being and to that end it has been maintained. Its development, and the development of each of its branches and services, has been consonant with the development and expansion of the nation, contingent upon circumstances and conditions at the different epochs of its history and the necessities then existing.

Whether in peace or in war, the Army is mainly dependent upon its supply department, the duties of which are important and multifarious, the obligation great, and the responsibility enormous; for, no matter how great may be its man power, how well-conceived its strategy, how accurately ordered its tactics, it can but fail if there be not always proper supplies, at the proper place, at the proper time.

The importance of a department which would be charged with the supply of munitions necessary to the conduct of war, and the establishment in that department of an office to be filled by one person having general control of its affairs and the guidance and superintendence of its operations, was recognized by those conversant with the needs of the Army when it was being organized. One of the first acts of General George Washington after his election as Commander-in-Chief of the Army was to forward to the Continental Congress, then in session at Philadelphia, the following communication:

> "In the arrangement of troops collected upon the spur of the immediate necessity, several appointments have been omitted which appear to be indispensably necessary for the good government of the army, particularly a Quartermaster General, a Commissary of Musters, and a Commissary of Artillery. These I must particularly recommend to the notice and provision of Congress."

General Washington, evidently, was not informed of the passage by Congress, prior to the date of his communication, of a resolution providing for a Quartermaster General for the grand army and one deputy under him for the separate army.

It is not within the purview of this article to recount the various and varied vicissitudes through which the system of Army supply has been brought to its present status, the greater number having been made prior to the war of 1861-1865. The changes have not been radical; they have been more in the nature of enlargement and improvement as necessity demanded; necessity due, in large part, to the territorial growth of the nation and the consequent broadening of the field of Army activity.

The Act of Congress, April 14, 1818, regulating the staff of the Army, organized the Medical, Quartermaster's and Subsistence departments substantially as they existed until after the war of 1861-1865. Under that Act there was adopted for the first time a philosophical, harmonious system of staff departments for the Army of the United States; a system under which each department charged with disbursement has a proper head who is responsible for its administration. As has already been said, the organization and administration of the several departments has, from time to time, been revised and improved, but the system has not been radically changed.

One of the most important changes affecting the Supply System was the consolidation, under the Act of August 24, 1912, of the offices of The Quartermaster General, The Commissary General and The Paymaster General of the Army into a single bureau to be known as The Quartermaster Corps of the Army. This consolidation placed upon The Quartermaster General responsibility for all supplies except special or technical articles to be used or issued exclusively by other supply departments.

In the performance of this duty there is practically no branch of industry in the United States which is not in some degree affected. In common with the general populace, the Army requires for its maintenance products of the farm and dairy, metals, building materials and supplies, tools and implements, machinery, leather goods, textiles, electrical supplies and equipment, paper, paints and varnishes, plumbing supplies and materials and numerous other items. Its needs include both raw materials and fabricated products. In a number of instances articles of a quality or design differing from that of similar products in ordinary use are required. While some of these special articles are produced in Army workshops, it is the policy of The Quartermaster General to encourage commercial production whenever practicable. This policy has brought about, in a number of instances, the establishment of entirely new factories or the installation of new machinery in those already in operation. In addition, the particular requirements of the Army have, in a number of instances, been adopted by the commercial world as standard, establishing the Army as one of the foremost factors in the development of industry and in scientific achievement. As the business, industrial and scientific world moves forward, improving old methods and standards, discovering and developing new ones, the Army of the United States today, as in the earliest days of the nation's history, furnishes in large measure the stimulus for its growth and development.

Sales Commissaries Serve Army Families

AN important activity of the Quartermaster Corps of great convenience to service wives and families is the operation of the sales commissaries. These Commissaries, a typical one of which is illustrated at the right, and one of which is located at every garrisoned post in the service, stock up to as many as 450 different items of nationally known brands of food products and household necessities. The brands purchased for resale in these government-operated service outlets are determined entirely by the demand expressed by the service personnel who deal at the stores. The same policy is pursued at the Post Exchanges, which are operated by the service personnel themselves. The annual turn-over in the commissaries for 1937 was $32,322,107.12.

Engineering and National Defense

The Army's Contribution to Engineering, and the Value of the Engineering Profession to National Defense

by

Major General Julian L. Schley

Chief of Engineers, United States Army

A VERY close association has always existed between the science of engineering and the art of warfare. Throughout history engineering works have exerted a profound effect upon military operations. The bridge constructed by the army of Xerxes across the Hellespont, and the great system of military highways of the Roman Empire afford classic examples of the dependency of plans of campaigns upon engineering structures. Conversely, much of present day engineering knowledge is directly attributable to the impetus given by military needs, and in many branches of engineering, the military engineer has led the way. In our own country, West Point was the first institution at which instruction in engineering was given. For many years its graduates pioneered in the engineering profession, and their work in the exploration, surveying and mapping of the unknown parts of the country, in laying out and constructing our early transcontinental railroads, and in more recent years, the initial Alaskan road system, not only were of great value to the nation but also served materially to advance these branches of the profession.

Army Engineers for more than one hundred years have been entrusted by the Federal Government with the development of its harbors and its inland waterways and, more recently, with the additional duty of provision upon a national basis of protective works for the prevention or control of floods. Under their supervision, numerous public works have been and are being undertaken, including such outstanding achievements as the construction of the Panama Canal, the development of our present tremendous maritime and lake commerce by the improvement of our ports, and the improvement of the Mississippi river system for navigation, together with its protection from disastrous floods. The scope and magnitude of these and other similar projects have enabled Army Engineers to become predominant in the field of hydraulic engineering. The principles developed by them through long experience, supplemented by comprehensive laboratory research, constitute an immeasurable contribution to engineering knowledge. The present highly developed equipment for subaqueous excavation on a large scale is largely due to their efforts.

Under the current national work relief program, numerous great dams, some of unprecedented size, are being constructed by Army Engineers at the present time. These projects, in addition to adding much to engineering knowledge regarding these types of structures, are, due to the large scale of operations required, developing many new methods of general construction. This work has also helped to focus interest upon and develop the principles of soil mechanics, hitherto a comparatively unexplored field.

Modern methods of aerial mapping, now rapidly replacing the existing laborious and time consuming ground mapping methods, have made great forward strides during recent years. Progress in this highly technical field is due, to a considerable extent, to development work now being carried out by Army Engineers in conjunction with the Air Corps, in order to meet the military demand for rapid production of accurate maps.

The fact must not be overlooked that the examples thus far cited, pertaining chiefly to activities of the Army Engineers, represent only a portion of the measure of military contributions to engineering. Other branches of the Service have contributed greatly through development programs carried on either directly by them or indirectly by stimulation of industry to find means for meeting their military requirements. Present day knowledge of metallurgy, particularly of high strength steels, of explosives, of radio, and of aeronautical engineering, are only a few examples where military requirements have had a profound influence. In fact it would be difficult to name any engineering field which has not been affected in some degree of military requirements.

Throughout the peace time life of the nation the Army's assistance to engineering is a continuing process. When war comes, however, the debt of engineering to the Army is more than amply repaid. The great reservoir of talent existing in the engineering profession then becomes a military resource which is of vital importance to national defense.

The engineering contribution to the success of our military effort during the World War is well known. Its scope and extent were such as to preclude more than a mere mention of it here. Suffice it to say that, had it not been for the capable and efficient endeavor of such eminent engineers as Parsons, Atterbury, Carty, and the great host of other members of the engineering profession who unselfishly and patriotically volunteered their services to their country our great war task would not have been accomplished satisfactorily.

Today warfare is more than ever an engineering game. The modern, highly mobile army, with its motorized transportation and heavy mechanized combat vehicles, creates demands for prompt, dependable and uninterrupted means of communication on a scale heretofore never visualized. The tremendous amount of equipment and supplies, much of it highly complex in nature, and the vast program of general construction and special tasks required for military operations will tax to the utmost engineering and industrial resources of the country.

In time of future emergency our country will more than ever before have need for engineers, and the services of that great body of civilian engineers, trained in their profession and interested in military affairs, form an indispensable element of present national defense plans. Engineer units constitute a large proportion—roughly one-eighth—of the total armed forces required upon mobilization. For the officering of these units alone, some 10,000 Engineer officers will be required. The selection and preparation of these officers for their war time duties is a most vital peace-time task of the Army. The interest of the engineering profession in military affairs and in the development of adequate plans for the protection of our country constitutes a real and effective contribution to the preservation of the welfare of our nation.

ARMY ENGINEERS BUILD FOR PROTECTION IN WAR AND PEACE

Above: Multiplex Projector developed by the Corps of Engineers for the coordinating of and reading of aerial maps taken from various positions.

Right: Sperry Mobile antiaircraft Searchlight, 60-inch, and sound locator equipment.

Lower: A general view of the upstream side of the piers for the main dam on the Bonneville project, showing the enormous concrete work.

Upper: Reinforced bridge with duralumin pontoons shown under 25,000 lb. load.

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Left: Mobile water purification unit—One furnished to each division.

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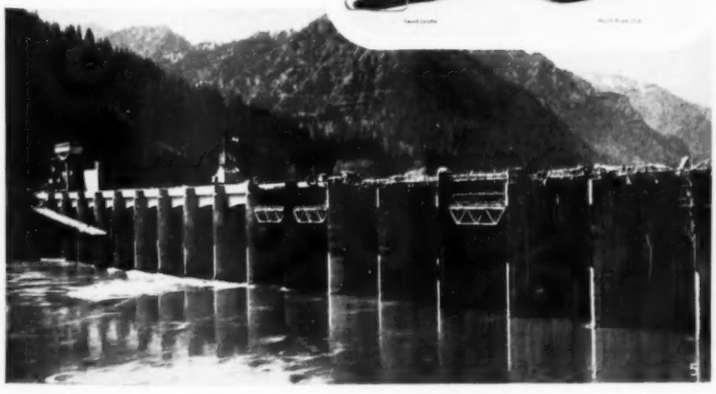
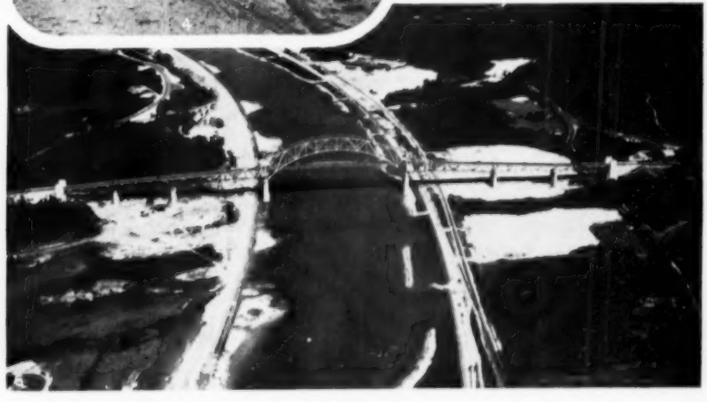
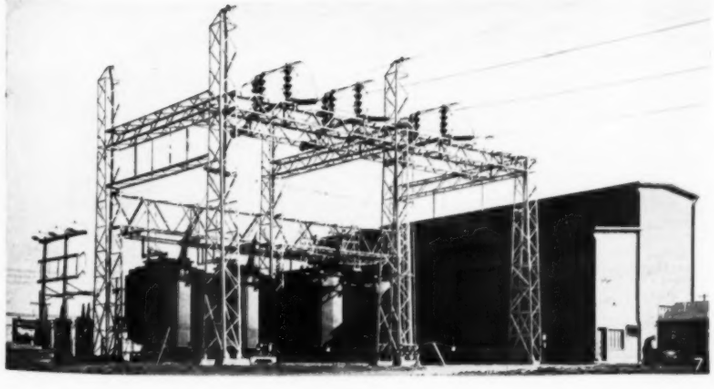
Lower: Cape Cod Canal showing a bridge, dry excavation, and revetment.





Lower: Portable carriage for land booster unit used in connection with pumping material into Fort Peck project.



Electrical substation on the Fort Peck Dam project showing the incoming line from Rainbow Falls and four transformers in place.

The Army and the Communications Industry

by

Major General J. O. Mauborgne

Chief Signal Officer, United States Army

THE American communication industry is a vast business. Americans undoubtedly communicate with each other more than any other people in the world. We have 19 million telephones, these being about half those of the entire world. Operating somewhat more than three-quarters of these telephones and with a total investment of about 5 billion dollars, the AT&T Company with its associated Bell Telephone Companies had an operating income for 1937 of more than one billion dollars, employed about 300,000 men and women, and operated about 81 million miles of wire. The remaining quarter of the nation's telephones are operated by about 6,500 companies, mostly small ones, and 25,000 rural lines and associations, practically all of which interconnect with the Bell System. The United States is served by excellent telegraph systems, operating a total of 25,792 offices. We have adequate cable and radio services to foreign countries. Our radio broadcasting networks give complete coverage to the nation. All these, together with other radio and wire services, the construction projects and manufacturing plants by which the operations are supplied, expanded and maintained, the research and development laboratories, the training schools and the personnel, administrative and financial offices and establishments, make the communication industry a vast and extremely active business.

Communication Industry Progressive

The communication industry of the United States is progressive. It employs thousands of engineers, inventors, research men, metallurgists, chemists, physicists and other scientists. These specialists are engaged in all types of research and development. Some are pure scientists. Their work leads them into the realms of yet undiscovered materials, circuits, mechanisms and even new scientific principles. Some are inventors or engineers. They employ the products of the pure scientist, making practical use of the new materials, circuits, mechanisms and scientific principles. Still other engineers are engaged in the improvement of equipment and of methods of manufacture. Frequently these improvements are individually of minor importance. Some indeed, when considered alone, are hardly worthy of note. But hundreds and even thousands of such small improvements have been necessary in the evolution of clumsy, crude, inefficient instruments into the marvelous articles which are now available to us at moderate cost. "Trifles make perfection, but perfection is no trifle."

I do not mean to intimate that the United States has a monopoly of engineering and inventive brains. But, as the officer responsible for the development and procurement of signal communication equipment for our Army, it gives me great satisfaction to observe the very high quality of American signal equipment and the alertness of our manufacturers continually to improve their product.

November 2, 1912—Lt. Joseph O. Mauborgne and Lt. Follett Bradley are photographed at Ft. Riley, Kansas, where they installed and operated the first military air radio set.

Communication Industry Indispensable to the Army

Our plans for national defense are based to a large extent upon a citizen army which is not only to be mobilized, but which is also to be equipped after the occurrence of the emergency. It goes without saying that an adequate commercial communication industry is indispensable to the signal communications of such an army. We are fortunate, indeed, in the capacity of American industry to produce communication equipment of excellent quality and in large quantity. Of course, it may be necessary for us in some cases during the early stages of operations, to accept substitute equipment for certain articles which will not be immediately procurable, and there may be other initial shortages for which there will be no adequate substitute. However, once our industry is geared up to quantity production of military communication equipment, I believe it capable of supplying all of our needs.

Fully appreciating the splendid condition and the operating efficiency of our commercial telephone and telegraph systems, we naturally plan to use these systems wherever they will fill our needs. This will permit us to concentrate our signal troops in the forward areas with the assurance that the communications in the Zone of the Interior will be well cared for by leased commercial services, extended and amplified by commercial personnel and equipment wherever necessary. Although but limited funds have been available for lease of commercial circuits, switchboards, telephones and teletype instruments during recent maneuvers and command post exercises, it has been demonstrated that these commercial circuits and equipment can be readily connected into the military system and that the whole can be operated effectively by military personnel. We are thus assured that in time of emergency we can count upon our commercial communication systems.

(*Continued on page* 107)

Present Trends in Ra

by

Col. David Sarnoff, Sig.-Res., U. S. Army

President, Radio Corporation of America

THIRTY-SEVEN years have now elapsed since Marconi first succeeded in sending a few feeble clicks by wireless across the Atlantic. During that period, the conspicuous accomplishments of radio have been one form or another of audible communication,—telegraphic code, telephone, broadcasting, and "beams" for the guidance of ships and airplanes.

Today, radio stands on the threshold of a new era, an era of visual communication, when radio will inform and entertain the human brain through the eye as well as by the ear.

Radio messages to the eye are of two kinds: permanent reproductions on paper of distant pictures or documents; and instantaneous, moving images of live subjects or of motion pictures, with simultaneous sound accomplishment. The first is called radio facsimile; the second, television.

Radio facsimile has been successfully employed on a commercial basis for several years past. It provides a daily picture-news service between Europe and America. The broadcasting of a facsimile newspaper into every business office and home—in half-hourly installments if desired—is perfectly feasible. The establishment of such a service is now an economic rather than a technical problem, and is the subject of considerable study and experiment at the present time.

Television—an enormously more complicated process than fac-

The Development of Navy Radio

by

Rear Admiral C. E. Courtney, U. S. Navy

Director of Naval Communications

THE Federal Communications Commission has recently promulgated the allotment of frequencies between 30,000 and 300,000 kilocycles. This event is like the opening up of new frontiers in the early history of our country and reminds us that we are about to enter upon a new and fourth decade of radio.

It will result in the occupation of the ultra-high frequency spectrum not only for the purpose of communications but for many special uses for which the characteristics of these radio waves are especially fitted. The industry has already produced tubes and circuits suitable for many practical purposes, and rapid progress is expected.

Only back as far as the war the spectrum frontier was limited to 1,500 kilocycles. The radio frontier was stabilized at this figure from 1895 to 1924 through the limitations of spark. Since the tube became the instrument of the communication engineer, it has been extended every few years to its present position in the ultra-high band, with unlimited possibilities in store for the future.

The fourth decade promises new industries based on newspapers received and printed in the home by radio facsimile, with California already in the field. It will bring to us television with vast changes in the entertainment field. Television receivers will become as common in the home as the broadcast receivers are now. It may witness the broadcasting of power, and the use of the tube as the instrument of the power engineer, as it is already that of the communication engineer.

Rear Adm. C. E. Courtney, USN

One will not miss the mark by far with prophesies of new industries, new billions of national income in this fourth decade.

The first period in the history of radio is known as the marine decade. The first use made of the new art was for communication between ship and shore, and therefore it became a prominent factor in the saving of life at sea. At the sinking of the Republic in 1909, amateurs caught the wireless call for help, and this, coupled with the failure of a vessel to receive the Titanic's call for help due to the fact that the operator was not on watch, resulted in laws which put radio on board sea-going ships and required watches to be stood, purely for the purpose of saving life. Today there are 15,000 ships equipped with radio.

In the field of science and research, the marine decade was notable for great inventions and their development. Among them, was the two-element tube as a detector in receivers. In 1907 there took place the discovery of the three-element tube by DeForest, one of the greatest discoveries in the history of science, with far-reaching social, economic, and scientific results.

The war opened up a new era for radio. Many of the discoveries of the marine decade were brought to fruition, and resulted in the continuous wave supplanting the wave train of spark as a medium of communication. Tube radio made great progress, and use was made of tubes as amplifiers, and the creating of pure frequency waves by means of tubes. The equipment of the tubes, compact, portable, light, and flexible, began to supplant that of the spark and the arc, heavy, cumbersome, and inflexible. Tubes allowed the generation of pure Sine waves, as differentiated from spark wave train of diminishing amplitude.

The next distinct period in the history of radio may be called the broadcast decade. It was notable for a vast increase in our national wealth through radio science. The progress made in the development of the state of the radio art during the marine and war decades led to the new industry of broadcasting. Our great communication systems were established, world wide communications became an established fact, and radio entered other industries in the form of many thousands of applications in the transfer of light and sound into electrical currents.

It becomes of historical interest to note the participation of the Navy in the development of radio throughout these different periods.

From the beginning of the art in 1895 the Navy was interested in the subject of radio, and due to its relationship with the sea, soon occupied a dominant position in the use our government made of radio. Soon the position of the various departments of the government in the use of radio had to be defined, due to the fact that as early as 1904, interference was its dominant drawback, as it continued to be for many years until the tube came into general use. For this purpose, the first Interdepartmental Board was called in 1904, and the President, Theodore Roosevelt, approved the report of the Board. The Departments of War, Navy, Agriculture and Commerce were represented, and it was agreed that the Army establish such wireless stations as might be necessary, unrestricted, for communication between command posts. If interference resulted with naval coastal stations, the Navy had precedence. Agriculture would turn over its wireless operations

(*Continued on page* 106)

in Radio Progress

simile—has advanced a long way on the road of technical accomplishment. But its commercial and artistic problems still call for fundamental solutions.

For the past two years the Radio Corporation of America has been conducting systematic field tests with the object of bringing television out of the laboratory into the sphere of public service. We have been transmitting experimental programs from our television station on top of the Empire State Tower in New York City, by remote control from the NBC television studios in the RCA building. We have checked these transmissions through experimental receivers installed in the homes of RCA engineers in the metropolitan area and suburbs within a fifty-mile radius of the transmitter. The results thus far have been encouraging and instructive. Many requirements that must be met by a commercial service have

Col. David Sarnoff

(*Continued on page* 111)

The American Navy in the World War

by

The Hon. Josephus Daniels

Secretary of the Navy, 1913-1921

ON the 6th day of April, 1918, with Franklin D. Roosevelt, then Assistant Secretary of the Navy, and other officials of the Navy Department, I stood on the balcony of the office of the Secretary overlooking the White House, awaiting the signal to flash an All-Navy telegram that President Wilson had signed the Resolution that a state of war existed between the United States and the Imperial German Government. My naval aide, Lieutenant Commander Byron McCandless, an expert in Navy signals, by pre-arrangement was at the Executive Office to signal when the President affixed his signature to the history-making Resolution. As McCandless wigwagged the signal, Lieutenant Commander Royal Ingersoll rushed down the corridor to the Communication Office, and radio and telegraph operators "let it go." Flashed from the towers at Arlington, the message went to every ship in the Navy: "Mobilize for war."

The fleet, summoned from Guantanamo, under command of Admiral Henry T. Mayo, the most efficient Commander-in-Chief in home and foreign waters during the whole period of the war, was riding at anchor in the very waters at Yorktown where the timely arrival of De Grasse's ships had assured the success of the war for American Independence. That *Alnav* message notified all the world that the American Navy was ready to send its fleet to beleaguered France and pay the more than century old naval debt to that country. It could have been phrased: "De Grasse, we return your call."

It was in such stride the Navy proved itself "the first line of defense" when Uncle Sam decided he must strip for action. "I did not have to give a single order of any kind or description to pass the Fleet from a peace to a war basis," said Admiral Mayo. Not a moment was lost and all units and individuals in the Navy were on their toes and never relaxed until the signal "Cease firing" brought an end to the greatest war in history, on the eleventh hour of the eleventh day of the eleventh month of 1918.

During the twenty months before the Armistice was signed, the Navy put more than two thousand ships in service, enlisted 533,000 officers and men, and its operations literally touched the whole globe. Operating with its allies from the Arctic to the Adriatic, from Corfu to the Azores, it manned the vast fleet of American transports carrying troops, munitions and supplies across the Atlantic and furnished man-of-war escort to protect them through the submarine-infested seas.

The Navy did not wait for the declaration of war to make ready. More than a year before that hour struck, President Wilson had said, "We shall take leave to be strong upon the seas," and had declared at Saint Louis early in 1916 that the United States must have "the most adequate navy in the world."

Preparedness in Advance of War

Long before Congress declared by Resolution of April 6, 1917, that the recent course of the Imperial German Government was nothing less than "war against the Government and the people of the United States," the Navy had been making ready for the possible emergency. On July 21, 1915, President Wilson had written me a letter saying that he would like, at the earliest possible date, to discuss with me "a wise and adequate naval programme to be proposed to the Congress at its next session." In the meantime, he suggested that we should "get the best minds in the (Navy) Department to work on the subject." He added: "I mean the men who have been most directly in contact with modern conditions, who have most thoroughly comprehended what the Navy must be in the future, in order to stand upon an equality with the most efficient and most practically serviceable . . . It should be a programme planned for consistent and progressive development of this great defensive arm of the nation."

Immediately upon receipt of that letter I directed the General Board of the Navy, headed by the distinguished statesman of the Navy, Admiral George Dewey, to prepare such a program, and discussed all phases of it with the Navy Council, composed of Assistant Secretary Roosevelt, Admiral Benson, Chief of Operations, and the heads of the bureaus in the Navy Department. As a result there was proposed to Congress at its session in December, 1915, what became known as "the Three-Year Program," providing for the construction of the largest number of fighting ships ever before authorized by any nation not actually at war. President Wilson was right when he had said that "Congress will certainly welcome such advice and follow it to the limit of its opportunity," for after full hearings, Congress approved the big building program, under the leadership of Chairman Lemuel Padgett and Thomas S. Butler in the House, and in the Senate of Chairman Tillman, Senator Swanson (now Secretary of the Navy), and Senator Henry Cabot Lodge. Leaders of both political parties coöperated heartily in insuring "a wise and adequate naval programme." Their patriotic attitude was in evidence not only in preparation before the United States entered the war, but also at every stage of its prosecution. Politics ended "at the water's edge" when the United States was at war.

Why Not More Destroyers?

Immediately upon the passage of the Act authorizing the construction of one hundred fifty-seven vessels, the contracts were let for their building, the plans having been expedited under the direction of Admiral David Taylor, Chief of the Bureau of Construction, one of the world's most distinguished naval architects, and Admiral R. S. Griffin, Chief of Engineering, an authority in his profession. The General Board's recommendations were made in the faith that the dreadnaught would give the decisive strength in war. At that time it was not fully realized—the Battle of Jutland emphasized the fact—that the dreadnaught would play a small part in the great war. Asked, after the close of the war, why he and other members of the General Board, in recommending the Three-Year Program, had not advised the construction of more destroyers, which became the most effective craft in the war against the U-boats, Admiral Sims answered:

> "If we could have imagined that the Germans would do what they did do, we could have prepared for it and built destroyers galore, if we could have persuaded Congress to give us the money. Nobody had any experience with this kind of war at all, and nobody could be savage enough in his disposition to know what the Germans would do, and therefore to prepare for it; so that I would advise you to be a little gentle in criticisms of naval officers in general, because they were not prepared for this war, because we are a more or less civilized people."

When the greatest menace confronted us, all in the Navy wished we had been wise enough in preparing the Three-Year Program to have asked for the construction of many more destroyers instead of stressing the need for dreadnaughts.

America's Chief War Contribution

In discussing, a score of years afterwards, the part the Navy played in the World War, when on land and sea the Navy won commendation from its Allies and the distinguished commander of the American Army of Occupation, it is easy to emphasize its largest contribution toward the winning of the war. I have often been asked the question: "What was the greatest thing America did in the World War?" It is easily answered. It was the raising and training of an army of four million men, navy of over 600,000 men, and the safe transportation of more than two million troops across the Atlantic to Europe. And all that was accomplished in eighteen months. Of the Navy's large contribution, General John J. Pershing, Commander of the American Expeditionary Force, wrote: "We fully realize that had it not been for the Navy, (*Continued on page* 114)

The United States Marine Corps During the World War

by

Major General John A. Lejeune, USMC-Ret.

Commander of Second Division, from July 28, 1918, to August 8, 1919

IN July 1914, when the World War burst on a surprised world, the strength of the Marine Corps was about 340 officers and 10,000 enlisted men. The so-called advance Base Brigade of Marines was then serving with the Army in occupation of Vera Cruz, Mexico, and the remainder of the Marine Corps was distributed in detachments serving on board Battleships and Cruisers, and on shore in Peiping, Guam, Olongapo, Pearl Harbor, the Isthmus of Panama, Nicaragua, Guantanamo, St. Thomas and the Navy Yards, Naval Magazines, Recruit Depots, and smaller stations in the United States. In December 1914, the Marine Brigade was withdrawn from the Vera Cruz and resumed station in Philadelphia, but was sent to Haiti as an occupying force, in July 1915, where the bulk of it remained until its withdrawal by President Hoover. In 1916, an additional force of Marines occupied the Republic of Santo Domingo where it remained during the World War and for several years thereafter.

The continuance of hostilities in Europe caused the Administration and Congress to turn their attention to the upbuilding and the strengthening of the Navy and of its military branch—the Marine Corps, with the result that the Naval appropriation bill which became a law in August 29, 1916, carried with it, not only very important personnel legislation for the Marine Corps, but also the increase of the Corps to 600 officers and 15,000 enlisted men with a provision for a further increase of 2400 men in an emergency.

War Increase Ordered

When War with Germany became imminent in the Spring of 1917, the President issued an order to increase the Navy and Marine Corps, and after war was declared Congress provided by law for a Marine Corps war strength of 1200 officers and 30,000 enlisted men, which was further increased in July 1918 to 3,000 officers and 75,000 enlisted men for the duration of the war.

Major General George Barnett, the war time Commandant of the Marine Corps authorized, as soon as war had been declared, the renting of a large tract of land for a Marine Corps base at Quantico, Virginia, which a year later was purchased, and also authorized the construction of the necessary buildings there and the construction and the installation of the essential facilities for about 7,000 men. He authorized similar construction work at the recruit training station at Parris Island, South Carolina.

Fifth Marines Organized

In the early weeks of the War, the President decided to send to France a war strength Regiment of Marines to accompany the Army First Division, A. E. F., when it sailed early in June, 1917. This Regiment was designated the Fifth Marines and consisted of organized companies as nuclei to which were added the number of privates necessary to bring the strength of the Regiment up to 2,500 men. Colonel Charles A. Doyen was detailed to command the Regiment.

A few weeks afterwards, the war strength of overseas infantry regiments was increased to 3,600 men, and a Replacement Battalion was organized at Quantico and sent overseas. In July, the President directed that the Marines serving in France be increased to a Brigade, and the Sixth Regiment and a Machine Gun Battalion were organized at Quantico under the command of Colonel Albertus W. Catlin and Major Cole, respectively. This force was sent to France by battalions whenever transportation was available and the Brigade of Marines was fully organized in January 1918 and was designated as the Fourth Brigade. Colonel Doyen was promoted to the rank of brigadier general and detailed to command the Fourth Brigade and Colonel W. C. Neville was ordered to France and assigned to the Command of the 5th Marines. The Fourth Brigade was assigned to the Second Division A. E. F., and whenever that Division is mentioned in this article, it should be understood that the Fourth Brigade of Marines is included.

The Second Division was assembled in the Bourment Training Area in January 1918, where it engaged for two months in intensive training preliminary to the strenuous and continuous Campaign in which that Division was to be engaged during the remainder of the war.

7th, 8th, and 9th Expeditionary Regiments

At Quantico, during the late summer of 1917, the Seventh, Eighth, and Ninth Expeditionary Regiments (1,100 men) were organized, trained and sent to Cuba to protect the cane fields from devastation and to Galveston, Texas, to be in readiness to afford protection to the oil fields in Mexico. Replacement overseas battalions were organized then as rapidly as possible during the continuance of the war, and were embarked for France in order to fill the vacancies caused by the large number of battle casualties in the Fourth Brigade of Marines.

During the summer of 1918, an additional brigade for overseas service was assembled and organized at Quantico. It arrived in France in September, 1918, and was utilized for important duty at the A. E. F. bases and supply depots. The Brigade and Regimental Commanders were Brigadier General Eli K. Cole, Colonel Smedley D. Butler, and Colonel George Van Orden. Colonel Butler commanded the Pontunagen Barracks and embarkation camp at Brest.

Turning our attention once more to the Second Division, we find that in March 15, 1918, orders came to it to enter the front lines in the Toulon and Troyen Sectors. They were located in the East Bank of the Meuse River south of Verdun. They were called quiet sectors, but machine gun and artillery fire was actively employed, and the infantry in the trenches in addition, to being constantly alert, conducted many patrolling and raiding operations and kept in constant readiness to resist similar enemy activities.

In May, Brigadier General Charles A. Doyen was invalided home and Brigadier General Harbord, Chief of Staff of the A. E. F., replaced him as Brigade Commander. When information that General Doyen had been sent home was received in Washington, Brigadier General John A. Lejeune, USMC, was given orders to proceed to France via the U. S. S. Henderson.

Second Division Moves

The Second Division after being relieved from front line duty about May 15, was transported to an area north of Paris in readiness to relieve the First Division in the battle lines at Cantigny. However, during the last few days in May, a catastrophe occurred which threatened to become a debacle. A great German army flushed with the victory at "Chemin des dames" had reached the Marne at Chatean Thierry, Soissons had fallen, Rheims was in jeopardy, and Paris was in danger. At this critical hour, the Second Division was hurled into the breach. It was deployed (*Continued on page* 112)

Civil War Submarine Action

Navy Department officials credit the sinking of the USS Housatonic by the Confederate submarine David, February 17, 1864, off Charleston, S. C., as the first sinking of a vessel of war by a submarine in actual warfare. The David was capable of submersion and was propelled by eight men on a pump handle. Sufficient air was contained for two or three hours. The torpedo was rigged on a spar. Although not known at the time of the action, it was discovered some years later that the little David blew herself up as well as the Housatonic and her entire complement of nine were lost. Following is reprinted from the ARMY AND NAVAL JOURNAL *of March 5, 1864, a graphic description written to the Editor by one of the crew of the Housatonic.*

TO THE EDITOR OF THE ARMY AND NAVY JOURNAL:
Sir:

As a history of the recent disaster of the U. S. steamer Housatonic may be of interest to many of your readers, I will attempt a brief statement of facts:

On the evening of February 17th, the Housatonic was anchored outside the bar, two and a half miles from Breach Inlet battery, and five miles and three-fifths from the ruins of Sumter—her usual station on the blockade. There was but little wind or sea, the sky was cloudless and the moon shining brightly. A slight mist rested on the water, not sufficient, however, to prevent our discerning other vessels on the blockade two or three miles away. The usual look-outs were stationed on the forecastle, in the gangway and on the quarter-deck.

At about 8:45 of the first watch, the officer of the deck discovered, while looking in the direction of Breach Inlet battery, a slight disturbance of the water, like that produced by a porpoise. At that time it appeared to be about one hundred yards distant and a-beam. The quartermaster examined it with his glass and pronounced it a school of fish. As it was evidently nearing the ship, orders were at once given to slip the chain, beat to quarters, and call the captain. Just after issuing these orders, the master's mate from the forecastle reported the suspicious appearance to the officer in charge. The officers and men were promptly on deck, but by this time the submarine machine was so near us that its form and the phosphorescent lights produced by its motion through the water were plainly visible. At the call to quarters it had stopped, or nearly so, and then moved toward the stern of the vessel, probably to avoid our broadside guns. When the captain reached the deck, it was on the starboard quarter, and so near us that all attmepts to train a gun on it were futile. Several shots were fired into it from revolvers and rifles; it also received two charges of buckshot from the captain's gun.

The chain had been slipped and the engines had just begun to move when the crash came, throwing timbers and splinters into the air, and apparently blowing off the entire stern of the vessel. This was immediately followed by a fearful rushing of water, the rolling out of a dense, black smoke from the stack and the settling of the vessel.

Orders were at once given to clear away the boats, and the men sprang to the work with a will. But we were filling too rapidly. The ship gave a lurch to port, and all the boats on that side were swamped. Many men and some officers jumped overboard and clung to such portions of the wreck as came within reach, while others sought safety in the rigging and tips. Fortunately we were in but twenty-eight feet of water, and two of the boats on the starboard side were lowered. Most of those who had jumped overboard were either picked up or swam back to the wreck. The two boats then pulled for the Canandaigua, one and a half miles distant. Assistance was promptly rendered by that vessel to those remaining on the wreck.

At muster the next morning, five of our number were found missing.

E. C. Hasseltine, ensign, was attempting to clear a boat on the port-side when it was swamped. He seized the back-board and jumped into the sea, and was seen to go down, but it was impossible to render him any assistance. He was a promising young officer, beloved by all of us.

C. O. Muzzey, captain's clerk, is supposed to have been in the cabin, and was probably killed by the explosion of the torpedo. One of the look-outs on the quarterdeck was never heard of.

A quartermaster jumped overboard and was drowned.

A fireman went below for his money, when the ship was sinking, and never came back. The captain was thrown several feet into the air by the force of the explosion, and was painfully but not dangerously bruised and cut.

It was the opinion of all who saw the strange craft, that it was very nearly or entirely under water, that there was no smoke-stack, that it was from twenty to thirty feet in length, and that it was noiseless in its motion through the water. It was not seen after the explosion. The ship was struck on the starboard side abaft the mizzen-mast. The force of the explosion seems to have been mainly upward. A piece ten feet square was blown out of her quarter-deck, all the beams and carlines being broken transversely across. The heavy spanker-boom was broken in its thickest part, and the water, for some distance, was white with splinters of oak and pine.

Probably not more than one minute elapsed from the time the torpedo was first seen, until we were struck, and not over three or four minutes could have passed between the explosion and the sinking of the ship. Had we been struck in any other part, or before the alarm had been given, the loss of life would have been much greater.

The Housatonic was a steam-sloop, with a tonnage of 1,240, and she carried a battery of thirteen guns. She was completed about eighteen months ago, and has been in the blockade ever since. She is the first vessel destroyed by a contrivance of this character, and this fact gives to this lamentable affair a significance which it would not otherwise possess. Deserters tell us that there are other machines of this kind in the harbor, ready to come out, and that several more are in progress of construction. The country cannot attend too earnestly to the dangers which threaten our blockading fleets, and the gunboats and steamers on the Southern rivers.

X

Off Charleston, Feb. 22, 1864.

The Contribution of the Submarine

by

Rear Admiral Yates Stirling, Jr.

United States Navy, Retired

COMMAND of the sea is a term employed to define the power of a belligerent to use the sea with reasonable security while denying it to the enemy. In the past and until the World War, the fighting instruments of seapower have consisted of surface warships. New instruments now exist — the airplane and the submarine. Air power may be overcome by superior air power. Undersea power can not be vanquished by undersea power alone. To destroy this new power, relatively small and fast surface vessels, aircraft and mines appear to offer the best chances for success.

The submarine is the weapon of the weaker belligerent on the seas; it continually points a dagger at the heart of the stronger fleet, provided that fleet actively enjoys its command of the sea.

For the United States, with two great oceans between it and any possible foe, the Navy, together with air forces, form the first line of National Defense. Before an enemy can arrive at our shores for the purpose of invasion, he first must vanquish our war fleet and our squadrons of fighting airplanes.

The submarine has become a recognized weapon without which a navy would be wholly incomplete. Starting scarcely three decades ago in its almost miraculously fast climb to a most prominent place among the units of a naval force, the importance today of the submarine to the victory at sea is well nigh colossal. Not only has it become an indispensable unit of seapower, but it bids fair, in the years to come, if it has not already arrived, to taking its place alongside the great battleship as a vital and all important weapon for both offensive and defensive action on the seas.

In those dark days of 1917, just after the United States entered the war, and when only those who could be cognizant of all the facts knew the utter seriousness of the situation and almost gave the war as lost to England; when the "Admiralty" was in a near panic in its anxiety to discover an effective means of curbing the submarine peril, then we, nearly three thousand miles away from the war areas, raised our voices and asked: "Where is the much vaunted fleet of England and why cannot it free the world of this octopus that is throttling the very life out of that invincible mistress of the seas?"

Even today, how many people realize the terrible danger of that hour to England? Often it has been claimed that the submarine went down to defeat. That this opinion does not stand before the known facts is evident to those who since have studied the history of those epochal times. The submarine as a weapon did not fail. It was the morale of its operators that could not measure up to the terrible nature of the actions taken against the submarine.

Great Britain's method of attacking the submarine at first was by a concentration of gun ships to fight it at the focii of trade routes, but although this method had succeeded in the past, now the enemy was of a different sort; one that would not stand and fight but disappeared completely from sight immediately an enemy was seen on the horizon.

The convoy system saved England and finally broke the morale of the hastily and incompletely trained crews of the German U-boats. While attacking a convoy of merchant ships or a fleet of warships the submarine then was forced to betray its location and accept the attacks of numerous fast destroyers and other vessels armed with many depth charges. This ordeal was more than other than the most expertly trained men could long stand and there was not ample time for Germany to achieve this expertness in her submarine crews, producing her submarines, as she was, in such large numbers.

The mine and the depth charge were the *bete noir* of the U-boat, yet, after four years of war, Germany owned on the day of the armistice more submarines than at any other time since the declaration of war. Germany is said to have laid down over 800 submarines, one-half of which were completed and operated and her losses by casualty and enemy action were nearly 200 U-boats during the four years of the war.

In complete recognition that the submarine as a weapon did not fail, all great sea powers began at once after the war to create for themselves submarine fleets of large size, both in numbers and in tonnage.

The United States, when the war ended, had laid down a large number of submarines of moderate displacement, 800 tons, and with the smaller ones already in commission, was in an excellent position to eclipse all other nations in the ownership of these valuable weapons. Leaving out of the count these smaller but excellent ships in their time, virtually pre-war types, to the number of 74 vessels, all yet in commission and in service, the United States since the war has built or laid down 33, mostly above 1000 tons displacement, while other nations, notably Japan and Italy, have out-built this country.

Japan and Italy unswervingly have pronounced their confidence in the submarine. Japan has in service about 70 submarines ranging from 700 tons to 2000 tons surface displacement, all built since the war and consequently embodying all the lessons learned through Germany's intensive submarine experiences during the war as well as those of all other nations. Italy on the day of her

to Our Industrial Development

The USS Salmon, latest fleet submarine, built for the United States Navy by the Electric Boat Company.

recent naval review for the German Premier, paraded and submerged at one time, 86 submarines, mostly under 1000 tons, and is said to have laid down 44 more. Italy's goal appears to be towards the control of the Mediterranean, using primarily submarines and land based air forces, a combination most unnerving in that closed sea to great surface war fleets of an enemy.

France and Great Britain also have made notable contribution to submarine construction. Great Britain has about 80, of which about 30 are of the largest type while France has a few more of each. Germany had been held down by the Versailles Treaty until the treaty became no longer binding to her. Today her construction does not appear impressive and are all of small type; but with her personal knowledge of the great value of that weapon and her known mechanical ability and capacity to build, we may reasonably expect her soon to be in the ranks of the leaders in submarine construction. Russia so far has concentrated on small submarines for particular purposes, but she, too, soon may be following the world trend towards larger submarines.

Surface warships in sufficient types and numbers can control the seas and destroy all weaker units that are unable to run away and must remain and fight. The submarine alone can not be subdued so handily, for the reason that underwater vision is negligible and once beneath the surface, despite all claims to the contrary, the submarine cannot be accurately located and followed after disappearing from sight.

Evolution

The modern ships, commonly known as "submarines," armed with torpedo tubes and usually also with guns and sometimes with mines are in reality surface vessels with considerable buoyancy which can be converted quickly into submarines by sealing up openings in the hull and flooding the ballast tanks. They are, therefore, more appropriately designated as "submersibles."

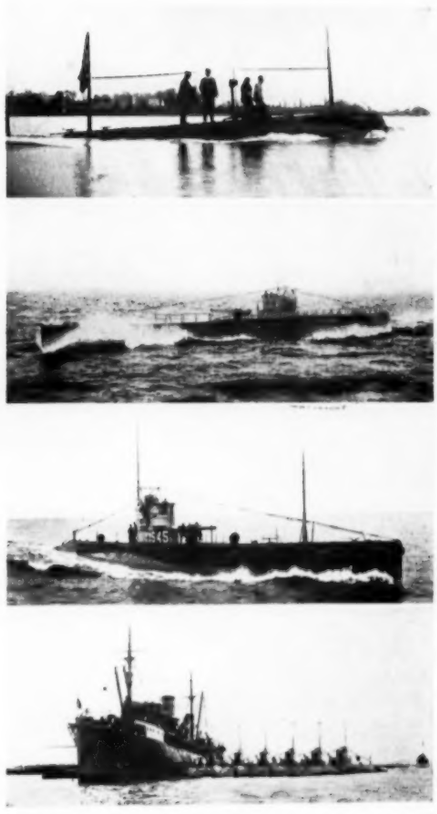
As is the case with surface warships, varying service requirements call for a number of different types and sizes of submersibles. On the surface, where such vessels spend the greater part of their lives, they are propelled by oil-burning Diesel engines and when submerged by electric motors fed from storage batteries. The same Diesel engines and motors are used to generate current when on the surface for recharging the storage batteries thus rendering the ship autonomous. Like ordinary surface ships, their speed and radius of action on the surface varies with the size. Current speeds range from 12 to 22 knots and radii from about 3000 to as great as 15,000 nautical miles. When submerged, however, both the speed and radius are necessarily limited; modern ranges being for speeds from 8 to 9 knots and for radius from 80 to 100 nautical miles.

While the name of the man who first grasped the military advantages of the submarine, viz: invisibility and immunity from gunfire, is lost in the mists of antiquity, history does record the name of the submarine boat pioneer, one Cornelius van Drebbel, a Hollander, who, in 1624, invented and constructed the first submarine boat about which little is recorded, except that it was oar-propelled, capable of submergence to fifteen feet and rendered habitable for a considerable period of time by "quintessence of air," whatever that may mean. During the remainder of the 17th century and the greater part of the 18th, no practical progress was made in the art of submarine construction and it was not until the time of the American Revolutionary War that the pioneer submarine torpedo boat appeared, the inventor of which was Sergeant Bushnell of the Revolutionary Army.

With the appearance of Bushnell's boat (The Turtle), the art of submarine navigation took a long stride forward and torpedo warfare made its bow as did also the screw propeller, for although the latter had been invented in England some years previous it had never been practically applied. The fact is worthy of note that before building this vessel, the inventor was required to educate his generation up to the possibility of exploding gun powder under water with destructive effects, so that he was practically the originator not only of the torpedo boat, both surface and submerged, but also of the submarine mine. The attacks made by this tiny one-man manually propelled boat on British men-of-war ushered in the era of torpedo and mine warfare.

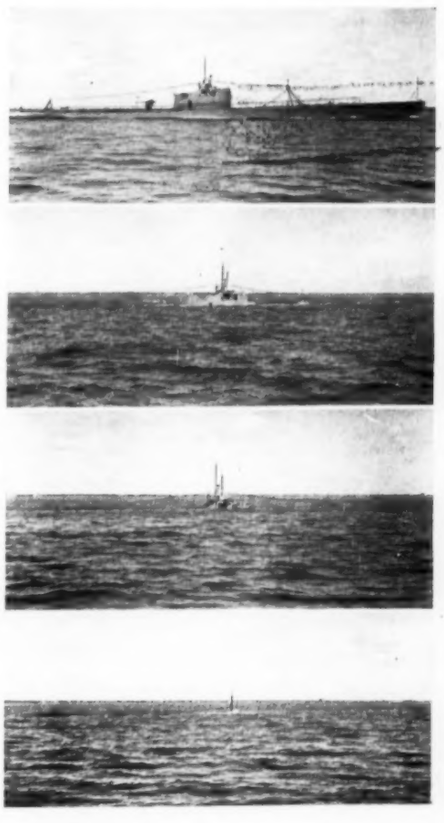
Bushnell's work was carried on by the famous engineer, Robert Fulton, who is best known for his pioneer work in developing the steamship. Fulton's submarine, the "Nautilus" was constructed in France in 1801 and

(*Continued on page* 108)



Above, reading from top to bottom:—USS Holland, 1898, first practical submersible; T Boat constructed during the World War, first Diesel engined submersible with a speed of more than 20 knots; Latest type of S boat constructed during the World War; Group of S boats with mother ship, 31 of these were constructed by the Electric Boat Company during the World War.

Below, Modern submersible, Cuttlefish, ordered in 1931, shown ready to trim for diving, trimming for diving, trimmed for diving, and diving.



The Adjutant General's Department of the Army

by

Major General Emory S. Adams

The Adjutant General, U. S. Army

THE primary purpose of this article is to trace in brief outline the history of the Adjutant General's Department during the last seventy-five years, the period elapsed since the founding of the ARMY AND NAVY JOURNAL, which is celebrating its diamond jubilee with this issue. In order to avoid a disconcerting abruptness, however, considering the circumstances attendant upon the internal war which was straining the energies of the War Department as well as those of the nation three-quarters of a century ago, it has been thought better to glance hastily at the major phases of the development of this branch of the service during the eighty-eight years preceding 1863. Thus will it be possible to understand more fully the problems engrossing the attention of The Adjutant General and his assistants at the moment when this brief historical sketch opens.

It may or may not be generally known that when our first Adjutant General, Horatio Gates, was appointed, the place of such an official was thought to be with the Army in the field. There General Gates and his successors in office for many years thereafter served, carting such records, as they were able to keep, in horse-drawn wagons. Their duties, viewed in the light of the conditions prevailing today, were equally bizarre. They included everything from those of office manager for the Commander-in-Chief to those of Chief of Staff of an Army in combat.

From the close of the Revolution to the War of 1812, the office of Adjutant General sometimes existed and sometimes it did not. The duties of the office did go on, after a fashion, but generally one officer held the position of Adjutant and Inspector. His previous military history, presumably, determined to which of his dual offices he would devote most of his energies. With hostilities imminent, however, a reorganization of the Army was effected and definite and specific provision made for the appointment of an Adjutant General, with rank of brigadier general. He was to be allowed one or more assistants as his duties necessitated, but not to exceed three. During the following year, for the first time in our history, an Adjutant General's Department was specifically and officially mentioned by name. Since that time there has been an Adjutant General continuously, save for a brief period after the turn of the century, when the department was designated the Military Secretary's Dept. for a few years. During the period of approximately forty-five years from the War of 1812 to the outbreak of the Civil War, the department underwent a steady evolution, gaining experience from the numerous Indian wars and the Mexican War, with the consequent result that when the War Department was called upon to recruit and administer an Army the like of which had never before been seen on this continent, a well defined and smoothly functioning nucleus was already in existence.

By the year 1863, when this sketch really begins, the department was still in a state of rapid expansion, involving both a phenomenal increase in routine work and the incorporation of new duties within its scope. With an officer personnel of only twenty, headed by Brigadier General Lorenzo Thomas, and the space and facilities which had sufficed during the period of peace immediately preceding the outbreak of the Civil War, the department was endeavoring to keep abreast of the changes brought about by the sudden introduction of more than a million recruits into the ranks of the Army.

Until May 1, 1863 The Adjutant General, in addition to being charged with the keeping of all records pertaining to the personnel of the Army—Regulars and Volunteers—was also charged with recruiting. He had procured more than a million and a half men since hostilities began. Then this task was turned over to the Provost Marshal General. That official's duties, however, ended with the procurement of recruits. Thereafter The Adjutant General was charged with their care at depots, their organization into regiments and companies for new commands, and their movement as replacements. Correspondence between the Army in the field and the War Department, including the issuance of orders and instructions to commanders, of course, cleared through the department as usual.

On May 1, 1864 work was begun on the preparation of the official records of the Civil War for publication. The excellent manner in which the manifold duties were performed during this year was attested officially by the Secretary of War in his annual report, which pointed out that the several bureaus of the War Department had not failed to contribute to the success of the Union Armies.

Immediately following the close of the war the duty of disbanding the Volunteer Army devolved upon The Adjutant General. By November, 1865, more than 800,000 cases involving the discharge of men enlisted for the emergency had been acted upon. The next year, when the office of Provost Marshal General was discontinued, all business relating to his bureau or to the raising of troops was returned to The Adjutant General. In addition to taking over the records of the Provost Marshal General for filing and classifying, it was necessary, also, to resume recruiting for the Regular Army, and before the close of 1866, more than 36,000 men had been raised. The next year, 1867, the Adjutant General's Department fell heir to the records and duties of the Commissary General of Prisoners.

In 1869, or thereabouts, the question was raised in Congress of consolidating the Adjutant General's and the Inspector General's Departments, a set-up which had prevailed for a number of years earlier as already mentioned. The idea was abandoned, however, as it was on numerous subsequent occasions.

The duties of the department were again enlarged in the year 1872 by the transfer to it of the unfinished business of the Bureau of Refugees, Freedmen, and Abandoned Lands.

Two years later Congress made an appropriation "to enable the Secretary of War to begin the publication of the Official Records of the War of the Rebellion, both of the Union and Confederate Armies." The work of preparation of this material, begun some years before, was resumed in the Adjutant General's Department. During the same year the military prison at Fort Leavenworth was established and The Adutant General was called upon to keep all records pertaining to the prisoners. At the same time he was directed to make frequent inspections of recruiting depots and rendezvous for the purpose of enforcing regulations.

During 1881 the adjutants general of the several military departments into which the country was divided were charged with the general supervision of the recently inaugurated system of post schools. This, of course, was in addition to their regular duties. The next year partial reports showed 147 such schools, with an enrollment of 975 enlisted men and 1,110 children living on reservations.

Congress in 1885 passed a bill to retire enlisted men after thirty years' service. The administration of this act devolved upon The Adjutant General. At the same time he was given the added duty of preparing outline histories of all military camps, posts, and stations in the United States.

The following year the Division of Military Information was established in the department. This division experienced a rapid growth, so that in 1892 it became necessary to reorganize it and specifically outline its functions. These included the collection and classification of military information of our own and foreign countries; preparation of instructions for the guidance of officers serving abroad as military attaches; the issuance of maps and monographs; correspondence with state authorities and militia officers upon various subjects; study and preparation of mobilization and transportation plans of militia and volunteers and their disbandment, and plans for the concentration of military forces at various strategic points. The division was also to be in charge of the Museum of Military Relics. Eleven years later, in 1903, the Military Information Division was turned over to the Chief of Staff.

The year 1889 saw an outstanding improvement in co-ordination within the War Department so far as (*Continued on page* 111)

Military Medicine, 1863-1938

by

Major General Charles R. Reynolds

The Surgeon General, United States Army

MEDICINE has made more progress since 1863 than in all the ages before that time. Living in the security of today, brought about by the advances in preventive and curative medicine, one can scarcely realize the health conditions in the days of the Civil War when the real nature of infectious diseases was unknown and their prevention was based on little more than faith. Yet all that has happened since then has failed to affect the verity of the Ninetieth Psalm, tenth verse: "The days of our years are threescore years and ten." Apparently the human machine is geared to last that long if left to the natural forces of wear and tear. However, more people are now reaching that age. Since 1850 the proportion of people living to the age of fifty has doubled; it is in this age period that the greatest saving of life has been made rather than in subsequent decades. In 1863 life expectancy was about forty years. Today it is over sixty-one years and 5½% of the population or 6,500,000 people in the United States are over sixty-four years of age, a matter of real importance in contemplating social security measures relating to old age. Medical science is largely responsible for these changes.

In 1863 the science of bacteriology was unknown. In 1876 it was a theory, a fact in 1882 when Robert Koch discovered the tuberculosis bacillus. Since then bacteriology has rationalized the practice of medicine, made aseptic surgery possible, and laid the foundation of preventive medicine and public health administration. Bacteria causing most of the infectious diseases have been identified and the methods of transmission have been determined. Then came the means of prevention, chiefly through sterilization or the destruction of disease producing germs to arrest their spread from person to person. Soon followed immunization and antitoxin treatment. Each is a method of fighting bacteria with "their own medicine," products of their own activity; immunization or vaccination by artificially stimulating a person in health to elaborate protective substances in the blood while antitoxins or curative sera supply the sick with ready made antidotes to bacterial poisons. In 1863, the only vaccine used was that for smallpox and no antitoxins or curative sera were known. The first and still the best antitoxin was that for diphtheria, first prepared in the early nineties. Our knowledge of bacteria and how to deal with them, together with the specific preventive and curative measures, have made it possible in Massachusetts to reduce diphtheria 99%, typhoid fever more than 95% and tuberculosis 90%. In 1863, of every hundred infants born in this country, more than twenty-five died during the first year; today less than five are lost. An understanding of bacteria as disease producers also led to the purification of water supplies, the Pasteurization of milk, and modern methods of waste disposal. The canning process, which was known during the Civil War, was developed on a commercial basis several decades later. It has contributed greatly in extending the range of diet, providing us with the fruits of the soil the year around, and from a sanitary standpoint has been of the greatest importance.

In 1863 no insect had been convicted of transmitting disease directly or indirectly to human beings. Now we know that certain kinds of mosquitoes transmit malaria, yellow fever, dengue, relapsing fever, and filariasis; the louse is responsible for typhus or "jail fever" and the trench fever of the World War; the flea, in an indirect way, may spread bubonic plague; the tick, Rocky Mountain spotted fever and tularemia, and the common house fly can mechanically carry on its feet the infection of typhoid fever and many other diseases. Insect-borne diseases which prevail in practically every part of the world are of immense importance in military operations. Our knowledge of the role played by insects in spreading disease is a development of the last forty years. The economic results in opening countries to habitation, raising quarantine, and extending commerce in an era when means of travel were quickening are incalculable.

What of surgery during these years? It is quite probable that more successful major surgical operations (*Continued on page* 116)

Keeping the Sailor Healthy

by

Rear Admiral P. S. Rossiter, (MC), U. S. Navy

The Surgeon General, United States Navy

THE ARMY AND NAVY JOURNAL'S picture of seventy-five years of progress would be incomplete without the story of the evolution of medical practice in the Navy. The contrast between a first rate vessel of the Civil War and a modern battleship is striking indeed. Medical progress has been equally conspicuous.

Seventy-five years ago medicine was an art. That is, the physician was compelled to formulate his diagnosis from the symptoms related to him and such signs as he could detect with his senses and to render treatment empirically. Today medicine has become a science. Innumerable diagnostic aids, which not infrequently alone are sufficient to establish the diagnosis, are at the disposal of the physician and his treatment is based on definite knowledge.

This period of great advance in medicine generally has seen equally great progress in naval medicine. Medical officers have become men of higher professional attainments, and the scope of their activities has broadened; dental treatment has become an essential part of attention to the health of the men; the Hospital Corps composed of personnel trained in technical duties and the care of the sick has been organized; the services of the nursing profession have been added by the establishment of the Nurse Corps; conditions detrimental to health have been corrected and facilities for the care of the sick, both afloat and ashore, have been vastly improved.

The early medical officers were able ship's surgeons. They were broadly educated in the classics and were as well grounded professionally as their contemporaries in civil life. They practiced medicine according to the best thought of their day and their many sound recommendations for improvement of conditions aboard the ships show their progressive ideas. They had little or no opportunity to exercise their professional abilities except at sea however, and any attempt to extend their activities aboard ship beyond the treatment of the sick was apt to be unwelcome. The modern medical officer is more than a ship's surgeon. At sea he is the medical officer of the ship, a part of her military organization. He is depended upon for efficient treatment of the sick and wounded, his advice and recommendations for promoting the health and well being of the men are sought and he is an integral part of the fighting team. Ashore he is a physician, often an outstanding specialist in one of the phases of diagnosis and treatment, a research worker or teacher or is engaged in solving the many medical problems arising in the varied shore activities of the Navy. To cover this wide range of activity his basic medical education is continually enlarged upon by individual study as well as by courses of instruction in schools within the Service and at leading civilian institutions.

Prevention and treatment of dental diseases became a part of the program for improving health and well being in the Navy when the Dental Corps was established in 1912. Prior to that time the only dental facilities were a kit of forceps with which the medical officers performed extractions. Any other dental treatment was obtained from dentists in civil life when opportunity presented, at the expense of the individual. Today dental officers are serving as part of the medical organization both afloat and ashore, and the best that their profession affords is an integral part of the professional care of the men of the Navy.

Since earliest times, men to assist the ship's doctor and nurse the sick, have been a part of the Navy. In Civil War days a ship's Surgeon was authorized to appoint a Surgeon's Steward and nurses or baymen, for the duration of a cruise. The Surgeon's Steward performed the duties of apothecary and the baymen attended the sick, but there was no provision for their services ashore. While they were, on the whole, conscientious in their duties, this system did not attract the most desirable type of man and attention to the sick often suffered in consequence. Since 1898, however, when the hospital corps was organized as part of the Medical Department for service ashore as well as at sea, the type of man entering the (*Continued on page* 116)

The Red Cross in Peace and in War

by

Rear Admiral Cary T. Grayson

*Chairman of the American Red Cross**

SINCE the American Red Cross was organized in 1881, it has discharged medical and social-service obligations to the armed forces of the nation. Today, the Red Cross stands prepared for what may come; its peace-time program, including essential help for the service and ex-service man, is constantly developing.

The Red Cross idea took root in 1859 when Henri Dunant of Switzerland organized a group of neighboring women to tend the wounded following a battle between Austrian and Franco-Sardinian forces. Later Dunant, with the aid of friends, succeeded in organizing volunteer Red Cross societies in many countries to aid the wounded in time of war and give assistance in disaster in time of peace. The American Red Cross achieved international affiliation with these societies in 1882, thanks to the militant leadership of Clara Barton.

The American Red Cross received its baptism by fire during the Spanish-American War and later during the revolutionary uprising in Mexico. But the world conflagration showed with particular clarity how important is the war work of the Red Cross.

During the World War there were 23,822 nurses enrolled by the Red Cross for service with the Army, Navy, or Red Cross. A total of 100,000 tons of supplies were shipped overseas. Nearly 4,000 French hospitals were given material aid. Red Cross supplied 294,000 splints for American soldiers and furnished more than 4,000,000 gallons of nitrous oxide and oxygen to hospitals in France.

The Red Cross canteens in France served 15,376,000 soldiers. A total of 1,726,000 civilian refugees were cared for. In Italy, the American Red Cross transported 148,000 wounded soldiers in ambulances and cared for 155,000 children.

Established Base Hospitals

The Red Cross established 24 base hospitals in France, and 12,000 Red Cross motor corps workers gave 1,000,000 hours of time in the United States transporting supplies and wounded. The Red Cross also erected 250 buildings in Army camps in the United States, including convalescent houses, nurses' homes, warehouses, etc.

The organization inaugurated hospital farms and gardens in France, and undertook the now famous "communications service" to give news to anxious families back home. Red Cross did anti-tuberculosis work in France on a large scale; did child relief work abroad; furnished supplies to American prisoners of war; operated hospitals in Siberia; established a medical service in Jerusalem; helped during the influenza epidemic in this country.

This is but a partial roster of Red Cross war activities, but it makes its point.

At present, there are 38,000 Red Cross reserve nurses enrolled who are on call to meet any emergency. In 3,400 Red Cross chapters, spotted throughout the country, trained workers deal with the problems of service and ex-service men or their families. Approximately a quarter of a million cases are handled each year.

In government hospitals and in regional offices of the Veterans Administration, Red Cross workers deal daily with hundreds of ex-service men who need personal aid for themselves or their families.

The Red Cross is likewise concerned with the problems of enlisted men and their families. Field directors stationed in Army, Navy, Marine Corps and Coast Guard stations —as well as in government hospitals—are constantly on the alert to give sympathetic assistance to thousands of enlisted men annually.

Cooperation of Armed Forces

These services are mentioned broadly. They mean work found for a veteran or enlisted man unfit for service and discharged from the hospital. They mean vocational training to fit men for new work. They mean help for his family until he can again carry on. They mean assistance in preparing and presenting claims for pension and other government benefits—assistance which is frequently inter-state and international in character.

As part of its normal peace-time program, during the past 10 years the Red Cross has helped the sufferers of 920 disasters in this country. Flood, fire, storm, explosion, shipwreck: whatever the emergency, the Red Cross has taken hold and followed through. The efficiency of the organization in dealing with these emergency situations is due in no small part to the immediate cooperation of the Army, Navy and Coast Guard when disaster strikes.

Other facts of Red Cross peace-time work are many and varied. The Red Cross has trained 2,000,000 men and women as first-aiders and life-savers. These trained Samaritans know how to prevent accidents and what to do when they occur.

More than 3,000 mobile and roadside emergency first aid stations have been established by the Red Cross in recent years. Trained volunteers man these emergency posts to give the highway accident victim a better chance to live. Millions of householders have been taught how to prevent home accidents the Red Cross way.

Red Cross rural nurses visit 1,000,000 persons each year, giving trained care at home and doing preventive work in country schools. In addition, 1,615 graduate nurses teach home care of the sick and hygiene routine to the family circle.

Red Cross chapters do civilian relief work to help thousands of families that are not eligible for assistance from federal and local relief channels.

Red Cross strength and cohesiveness lie chiefly in its volunteer workers who labor devotedly throughout the year. They make Braille books for blind readers, surgical dressings, garments for the needy. They serve meals, prepare and can food for those who can not afford varieties essential to proper diet. They assist the overworked staffs of hospitals and present a solid front when disaster strikes.

The Junior Red Cross, numbering 8,500,000 school boys and girls, aid the less fortunate children of their communities. Through international correspondence and the exchange of information, the Red Cross Juniors strive for better understanding between the future men and women of nations.

*This article was prepared for this issue by Admiral Grayson just prior to his death.

"The proclamation of the President of the United States of August 22, 1911, made a great step forward towards the modern conception of a Red Cross which should have a definite place in the medical establishment of the military service. It provided that the personnel rendering aid to the land and naval forces would constitute a part of the sanitary service thereof; that they would be subject to the military laws and regulations, and should not render service in the zone of the front except in cases of great emergency. This was followed about a year ago by a reorganization of the central office of the American Red Cross so as to divide all of its external activities into two departments—that of civilian relief, which should occupy itself with the humanitarian activities which had heretofore largely monopolized its attention; and that of military relief, which should undertake to organize the units and train the personnel which the Medical Departments of the Army and Navy should desire to call to their assistance in time of war."—*From the* ARMY AND NAVY JOURNAL *of November 25, 1916, quoting Col. Jefferson R. Kean, MC, USA, director general of the Department of Military Relief of the American Red Cross.*

Keeping the Navy Seaworthy

by

Rear Admiral W. G. DuBose, (CC) U. S. Navy

Chief Constructor of the Navy

KEEPING the Navy seaworthy in 1863 required then, as it does today, the building and maintaining of ships capable of completing the mission for which they are intended and of performing duty assigned. These problems in 1863, as we look back, appear to have been solved by crude rule of thumb methods, and to designers of those days the requirements probably often appeared practically unsolvable, especially so when it is considered that all the developments were being judged by sailing ship standards. Steam power was being advanced aggressively by the engineers and earnestly opposed by the sailors. Iron was coming to the fore as the principal structural material, while wood—principally oak, the material of which ships had been built for centuries—was rapidly passing out with the picturesque sail.

In 1863 the requirements of the Navy were governed by the needs for prosecuting the Civil War. The types of ships that were built during the war were selected for special purposes. The "ninety-day gunboats" and the "double-enders" were added to the Navy list, and merchant steamers were purchased and armed. The armored ship made its appearance. The ships of this period which have left the greatest impression on future designs were the New Ironsides and the Monitor.

As a seagoing iron-clad the New Ironsides was a success for the service required. She was built in 1862 by Cramp's. The length was 220 feet, beam 60 feet, draft 13 feet, displacement 3296 tons, and speed eight knots, with an indicated horsepower of 700. Her battery consisted of fourteen 11-inch smooth bore guns. She was built of wood and was covered with inclined armor 4 inches in thickness, which made her impervious to the artillery that was used against her during the Civil War. In one engagement she was struck seventy times, but at the end she withdrew in perfect fighting condition. She even survived the explosion of a torpedo placed against her hull.

The Monitor was the most unique fighting ship that appeared during the War. She was primarily designed for harbor and river service and was therefore lacking in the seagoing requirements which were included in the later designs of this type. She was of composite construction, iron and oak, and driven by a single propeller. Her draft was 10 feet, freeboard 18 inches. The single turret, with two 11-inch guns, mounted amidships, had an inside diameter of twenty feet, and was nine feet high; was plated with nine 1-inch layers of iron plates. The result of the contest of the Monitor with the Merrimac, the first battle between iron-clads, attracted the attention of the world. The London "*Times*" said:

> "Whereas we (Great Britain) had available for immediate service 149 first-class warships, we now have two, these two being the Warrior and her sistership the Ironsides. There is now not a ship in the English Navy apart from these two that it would not be madness to trust to an engagement with that little Monitor."

The Monitor was the progenitor of all the turreted vessels in the fleets of the world. She was lost at sea, but the other monitors which quickly followed her were improved in design and bore themselves well through the elements and battles of the Civil War, proving capable of making limited sea voyages and of resisting the effects of the artillery that was in use during the period of their usefulness.

Toward the end of the Civil War the demand for more speed to end commerce raiding resulted in the design of faster ships, of which the two best known are the Wampanoag, launched in 1864, and the Madawaska in 1865, both built at the New York Navy Yard by Constructor B. F. Delano. These vessels had fine lines for speed, were built of wood, and were driven by single screws. The Wampanoag, in January 1868, made the extraordinary speed of 16 knots, and slightly more at times,—a speed not equalled by any vessel for many years. She was not finished in time for war use, and after the close of the war she became the receiving ship Florida at New London.

The next fifteen to twenty years saw the rapid decline of our Navy, while in the meantime other nations abroad, having learned the lesson of the iron-clad from us, earnestly went to work at modernizing and building up their fleets.

Thus draws to a close the period in our Navy known as the Old Navy. During this period little attention had been paid to freeboard and to watertightness from the standpoint of internal subdivision and closures. Wood had been displaced by iron, and steel was about to displace iron. The hulls of the double-turreted monitors, the 6000-ton Puritan and the four 3900-ton Amphitrites, built of iron, were nearing completion in 1882 when the building of the New Navy of mild steel was about to begin.

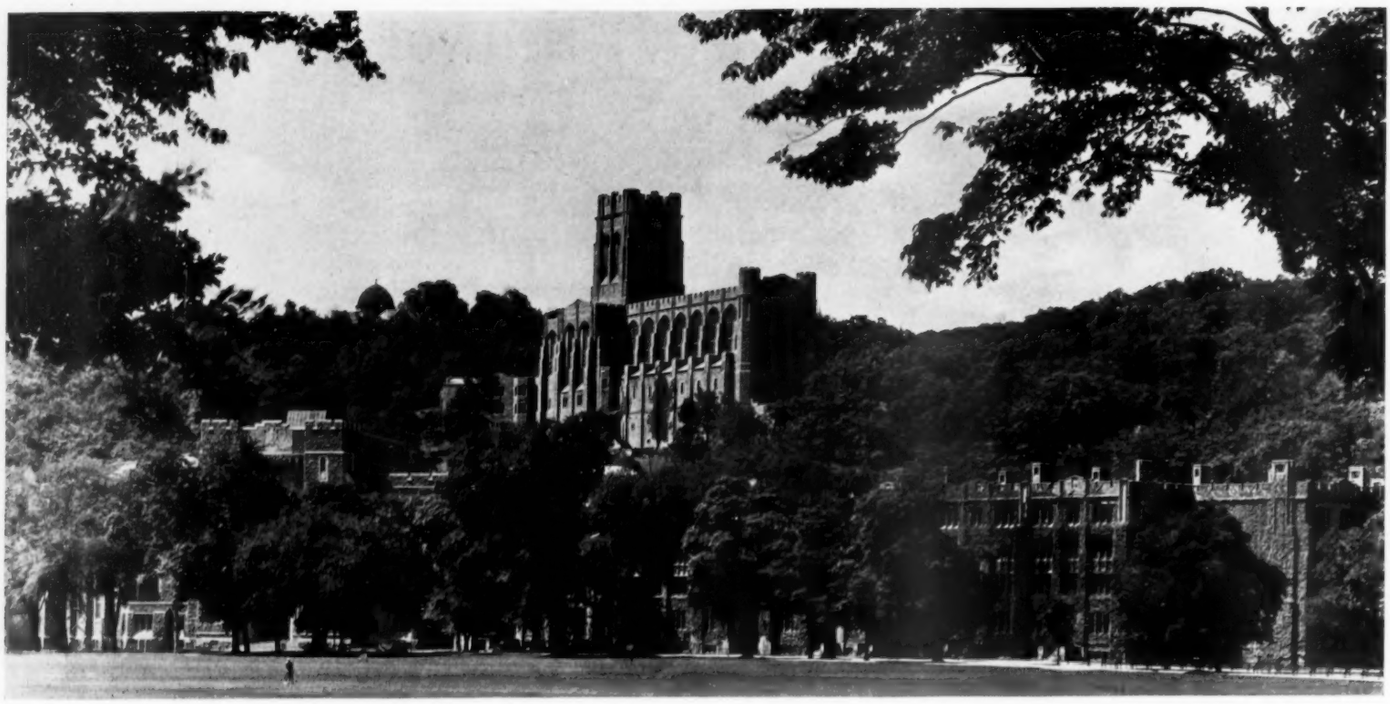
The so-called "New Navy" was started in 1883 with the use of steel instead of iron. Henceforth the design and building of our ships were to receive more scientific attention than heretofore. The low freeboard monitors were to be displaced by ships having more freeboard, better sea-keeping qualities, and better habitability. The first ships built of steel were the unarmored cruisers Chicago. Boston, Atlanta and Dolphin. The steel used in these ships was required to be "of domestic manufacture having as near as may be a tensile strength of not less than 60,000 pounds to the square inch and a ductility in 8 inches of not less than 25 per centum." This high standard at the outset forced the early development of high grade steel in this country.

Our Constructors were now obtaining the benefit of training abroad, and knowledge acquired by them of the foreign practices and disasters was of use when the designs for the steel Navy were being prepared. The British Captain, a turreted ship, capsized on September 7, 1870, with great loss of life. The investigations and reports made on her loss showed the effect of freeboard on the height and range of stability curve and resulted in a marked advance in utilizing the knowledge of the stability of ships. The methods of conducting longitudinal strength calculations with ships poised on the wave, with the wave crest and hollow alternately amidships, were used for comparing the scantlings of different designs. Experiments with actual ships at sea have confirmed the value of this procedure.

Additional ships were authorized by the Congress of 1884-1885 and in 1886 there were authorized the Texas, a second-class battleship; the Maine, an armored cruiser; the Baltimore, a protected cruiser; the Vesuvius, a dynamite cruiser; and the Cushing, a torpedo boat. The Texas and Maine were the first modern armored cruising ships constructed by the United States. The Cushing was the pioneer of the torpedo boat flotilla. The Texas and Baltimore were built from plans purchased from England. To assist in further improving our ships the Navy established a Model Basin at the Washington Navy Yard in 1890. This was a step much needed, since Great Britain had been investigating the forms of ships by model experiments since 1872. Naval construction on the New Navy was well under way by 1893 when the three ships of the Indiana class were launched. The Iowa of 11,340 tons, launched in 1896, was an improvement over the previous three, as she had more freeboard and balanced turrets. Then in 1898 came the Kearsarge and Kentucky, followed by the three ships of the Alabama class, and the Ohio, Missouri and the second Maine.

Following the war with Spain, the necessity of protecting overseas territory brought about a change in policy which resulted in the building of ships with increased displacement, greater seaworthiness and cruising radius. The cruise of the fleet around the world in 1908 fully demonstrated the seagoing qualities of our ships. In 1910 the first 14″ gun battleships were authorized; and in

(*Continued on page* 115)



The United States Military Academy

by

Brig. Gen. Jay L. Benedict

Superintendent, U. S. Military Academy

LOOKING back across a span of seventy-five years to the West Point of 1863, we see an institution already firmly established in its proper role in the nation's history. Fifty-two years earlier, on the very day of the outbreak of the War of 1812, the country had learned that a policy of apathy and neglect will never produce officers for its armies. That day West Point, though launched with such high purpose ten years earlier, existed on paper only. No instructor or cadet was present; the doors were closed. The response of Congress to the situation, and the resultant rebirth of the Academy under the direction of Sylvanus Thayer, "Father of the Military Academy" and Superintendent from 1817 to 1833, marked the true beginnings of the West Point of today.

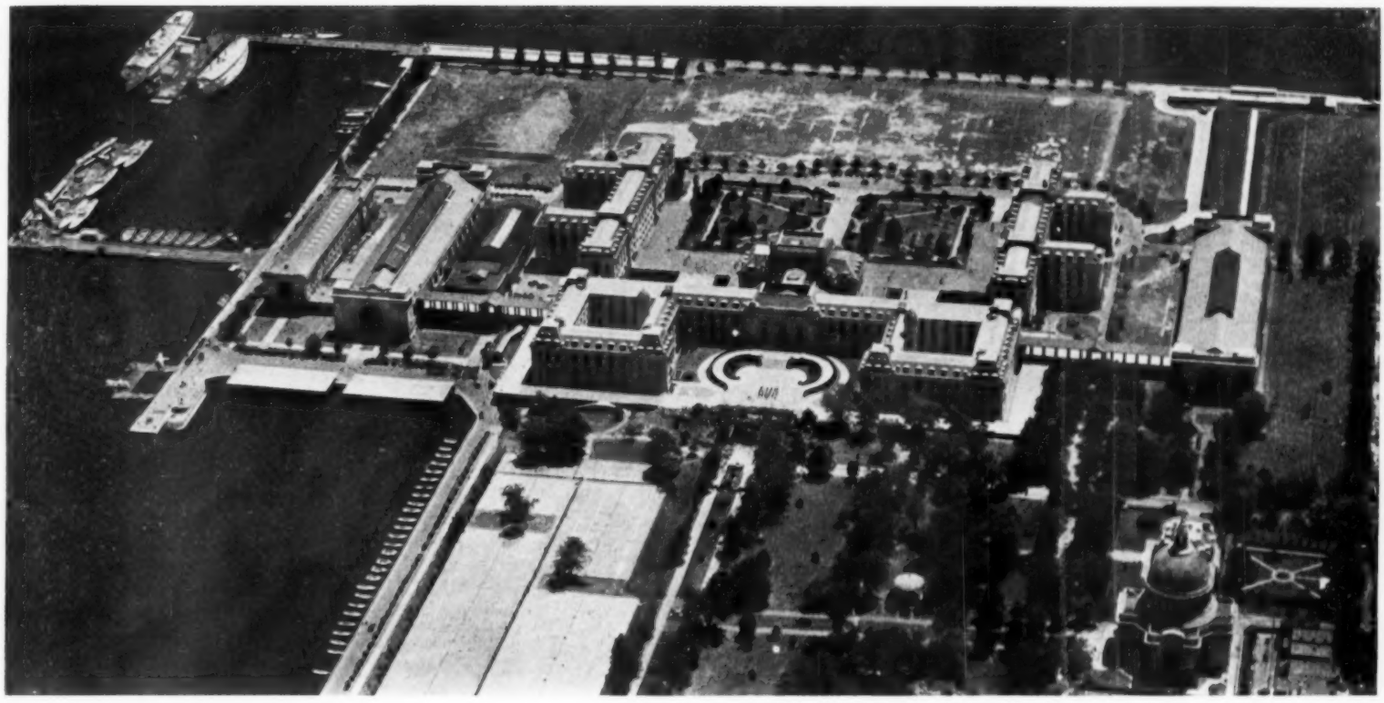
However, the almost hysterical enthusiasm for West Point following the victories of the War with Mexico was succeeded by a decade of apathy. When the outbreak of the Civil War was attended by the resignation of 65 cadets, to accept commissions in the Army of the Confederacy, widespread criticism of West Point was heard.

In "The Spirit of Old West Point," Morris Schaff (U.S.M.A. '62) pictures vividly the bitterness of the stress aroused in the Corps during the years immediately preceding the war. The outbursts on the floor of Congress were paralleled in the barracks and on the drill-grounds of West Point. And, with the strong emotions of youth, these youngsters showed even less restraint than did the members of Congress. Personal combat was frequent, and there was occasional sword-play, though fortunately no one was hurt. And yet that bitterness was forgotten when the day of resignation arrived for the cadets from the South; there was grief among all, North as well as South. Human bonds after all proved stronger than the emotions of political differences. Later, the rencontres of battle-field, hospital and prison-camp brought together many of these products of the storm-torn years. And always we read of the affectionate concern they felt for each other, and of their never-ending devotion to West Point. George Custer, in an interval of the Peninsular Campaign, acting as best man at the wedding of his wounded prisoner-classmate, John W. ("Gimlet") Lea, was a harbinger of the ultimate true reconciliation of North and South.

The part which these men and their predecessors played in the Civil War reads like a large-scale repetition of West Point's record in the war with Mexico. In the final year all of the armies, nearly all of the corps, most of the divisions and many brigades of the fighting forces of the North were under the command of West Pointers. In the South their part was even more prominent. And with that record before it, the country has never again questioned the soundness of West Point's mission, or the execution of that mission.

Nevertheless, the years of relative peace after 1865, interspersed with occasional Indian Wars, led once more to an attitude of national indifference toward West Point's welfare. Appropriations to keep the development of the plant abreast of civilian educational institutions were not forthcoming. But in the annual report submitted June 30, 1899, by the late Elihu Root, as Secretary of War, the nation found a reminder of its obligation. He declared:
"I believe that the great service which it (the Military Academy) has rendered the country was never more conspicuous than it has been during the past two years. The faithful and efficient services of its graduates since the declaration of war with Spain have more than repaid the cost of the institution since its foundation. They have been too few in number and too heavily burdened."

Plans were at once set on foot for a program of expansion and modernization of plant and facilities. They were given added impetus by the President, Theodore Roosevelt, who indicated his stand at the 1902 Centennial Exercises of the Academy with the statement: "This institution has completed its first hundred years of life. During that century no other educational institution in the land has contributed so many names as West Point *(Continued on page 104)*



The United States Naval Academy

by

Rear Adm. Wilson Brown, U. S. Navy

Superintendent, U. S. Naval Academy

WHEN the ARMY AND NAVY JOURNAL was founded in 1863, the midshipmen attached to the Naval Academy were quartered at Newport, Rhode Island, where they had been removed because of the apprehension of Captain Blake, then Superintendent, who feared the capture of Baltimore and environs by the Confederate Army. The grounds at Annapolis were used as an Army camp. In September 1865 the midshipmen were brought back to Annapolis. Admiral David Dixon Porter assumed duty as Superintendent and began the expansion and improvement which has characterized the history of the Academy since.

In 1863 no one with less vision than a soothsayer could have predicted the requirements of today. The buildings of the Academy were laid out on a generous scale for the requirements of the times. Buildings were separated by a dignified spaciousness. Academic activities were centered about old Fort Severn and the water front. The technique of sail was the dominant note and a new curiosity was rising as to the possibilities of steam.

The Tripoli monument had been placed in the Academy grounds in 1860. Numerous captured battle flags and other souvenirs of tradition began to appear and to win veneration. The water front and grounds attained a beauty that has cast its spell for generations in the hearts of youth and has held the loyal affection of old age.

By the turn of the century buildings had attained an air of quaintness and of antiquity. Sail had fought a losing battle with steam. Murmurs were to be heard of inadequate buildings and equipment. By almost unanimous consent the beautiful old full rigged ship was abandoned as a means of training the modern mariner. By 1905 plans were in full swing for the replacement of all buildings to make way for and to keep abreast of the new Navy. Only the two guard houses at the main gate now remain of all our 19th century buildings. Nineteen hundred and eight saw the completion of quarters, armories, gymnasiums, laboratories, libraries and class rooms on the grand scale—designed to meet all future requirements. Further expansion was accomplished during the World War, and yet today again we are crowded to the bursting point. Every building and every inch of ground is utilized to the full. The spacious dignity of former times is giving way to city-like congestion. In keeping with the times, activity has replaced tranquillity. As to the future—who knows?

As in its physical aspects, the curriculum of the Academy has had to keep pace with rapidly changing conditions. The laws of storms, sound navigation, good seamanship, point blank ordnance, reading, writing and arithmetic—and a polite knowledge of languages—has had to be supplemented by a profound knowledge of the modern man-of-war of various types, long range ordnance, thermo-dynamics, high powered steam, electricity, radio, aviation.

Throughout the years the Academy has preserved the salient points of its original charm. The friendly trees, the lovely harbour, the gentle climate are still the same today. As one approaches from seaward there is little new to affront the eye. The Capitol and the steeple of St. Anne's still serve as noble landmarks. The sky line of the city serves as a reminder of the friendly welcome Annapolis has given for generations to thousands of aspiring candidates from cities, villages and farms of the entire nation. The Chesapeake "Buckeye"—the most graceful of schooners—still wends its leisurely way from port to port.

From the beginning the Academy has held true to its course. Our alumni have just reason to be proud of the integrity, capacity and accomplishment of our fellows. My contemporaries will agree with me that the modern graduate has the talent and resource to meet with ability the many demands made upon him.

Throughout the years, the Naval Academy has been a stern but kindly mother to thousands of the nation's youth. It has given all who have entered a generous opportunity to learn the elements of their profession and it has done its utmost to instill principles of integrity, fairness, courage, patriotism, loyalty and honour.

The Steam Navy

The Introduction of Steam; Early Experiments with Petroleum as Fuel; the Electrical Era; Use of Telephones and Radio; Light Weight Alloys.

by

Rear Admiral Harold G. Bowen

Engineer-in-Chief, United States Navy

WHEN the first issue of the ARMY AND NAVY JOURNAL appeared in August 1863, the battle of the Monitor and the Merrimac which occurred in the previous year was still the subject of violent discussion. This engagement was unique because for the first time in history two war vessels maneuvered against each other dependent only on their own self-contained power.

Conservatism, ignorance, and the "vested interests" still refused to acknowledge the superiority of steam over sails, but they fought a losing battle. Each decade saw the advancement in steam engineering, improved materials, better designs, elimination of losses. The courageous and enthusiastic engineers pressed forward in spite of obstacles and discouragements until in 1893 the old cruiser New York appeared in all her glory with no sails or spars.

The early history of the advance in steam engineering might be written around those farsighted engineers who believed in the future of steam and devoted all their thought and energy to making their visions an accomplished fact. One of these pioneers, Benjamin Isherwood, in 1863 designed the machinery of the Wampanoag, a fast commerce destroyer. She made 17 knots on trial, 2 to 3 knots more than the fastest vessel then in existence. It was 21 years before this speed was equalled in the U. S. Navy. Naval opinion was decidedly against these vessels and they were soon retired. Isherwood included such revolutionary ideas as superheat boilers, step-up gears and vertical tubular boilers. The never ceasing effort for improvement resulted in a Navy Board experimenting with petroleum as a fuel as early as 1867.

Economy and lack of interest for many years after the Civil War caused a period of almost no Naval shipbuilding. It was fortunate, therefore, that when everyone awoke to the need for rebuilding the Navy, there was available another genius to step in as head of the Bureau of Engineering, George Melville. A strong character, a splendid engineer, he had the courage to drive forward into new fields and applied his knowledge and vision to making the "New" Navy a thing still to be admired. On the old Maine he took the cylinders out of the bilges and placed them on top of the engines as we see them today. He changed the engines from compound to triple expansion, he substituted forged steel columns for cast steel frames. In the Marietta he put water tube boilers, marking the end of the fire tube type. He saw the inherent advantages in turbines brought out in 1897 by Sir Charles Parsons and built the rival types into sister ships, the Salem and Chester to compare their performance with the reciprocating engines of the Birmingham. Appreciating the problem of marine propulsion, he consulted with Macalpine and Westinghouse to develop the high speed reduction gear. To him we owe the Fuel Oil Board with its classic report, the standardized methods for ship trials, the Engineering Experiment Station and the postgraduate education in engineering in the Navy. He was always fighting for more speed.

Following Melville came what may be called the electrical era. The advantages of electricity on board ship were well known but lack of confidence and the need for utmost reliability had obstructed its adoption beyond the elementary use for light and minor power units. Again farsighted engineers urged and fought for the wider use of this new agent of mankind. Gradually such important parts as the turrets, the steering gear, the anchor engine, were changed from steam to electricity. Complicated ship structure forced the use of telephone instead of voice tubes, radio came to its own and finally the main engines. Only one who knows by long experience the conservatism of the average seagoing man can appreciate the courage of making our first line ships electric driven. It was a success of the highest order and when the Lexington and Saratoga developing 180,000 horsepower were commissioned, a peak was reached which has not been touched since.

The Washington Treaty in 1922 gave the Naval engineers a new problem—limitation in weights combined with the never ending demands for more speed, more power. Responding to this impetus a complete revolution of specifications and design resulted. The world was combed for new materials, new light weight alloys; designs calling for higher temperatures, high pressures were developed. Every piece of machinery on board ship was analyzed with these questions —how can its economy be improved? How can its weight be decreased? But the basic requirement of utmost reliability and low upkeep cost were never neglected. The result is that today the Bureau of Engineering is installing twice the power in half the space required only a few years ago.

The end is not yet in sight. Realizing that true progress must be based on research, the Navy has its laboratories for finding the answer for Navy problems. The Naval Research Laboratory, the Engineering Experiment Station, the Material Laboratory, the Boiler Laboratory are, with the support of Congress, striving to solve the problems of today. The Navy is collaborating with Industry to develop and build better engines and more efficient apparatus. The progress of the past 75 years will be continued and who can say what the next three quarters of a century will bring.

When the U. S. Armored Cruiser New York appeared, as Admiral Bowen states in the article on this page "in all her glory with no sails or spars," the ARMY AND NAVY JOURNAL of May 27, 1893, reporting her trial off the New England coast, stated: "The start was a flying one and the indicator showed an average of 136 to 138 revolutions. Forty-eight firemen and twenty-four coal passers kept the furnaces supplied with fuel. Twenty-four first class engineers watched the engines in different parts, the cranks, journals, valves and cylinders being oiled constantly. At so great a speed the vibration was very little. The following dispatch from Admiral Belknap, USN, was sent from Gloucester, Mass., May 22, to the Navy Department, 'Successful speed trial of the New York today. Speed approximately calculated at 21-1/10 knots; correction for the tidal influences may change this a little. Average revolutions about 135. Machinery worked beautifully. All conditions excellent.' The magnificent record made by the New York in her official trial was a revelation to the Navy authorities. They had no doubt she would meet the severe requirements of the contract, but they were hardly prepared to hear that this large craft, with her great labyrinth of machinery would make the first official run without a hitch of any kind and come across the line with the handsome and unequalled record of 21.07 knots. We have always argued earnestly in favor of the policy of encouraging American industries in giving out orders for Army and Navy material, and the result is justifying itself, so far as the Navy is concerned. We doubt now whether there is a single naval officer who questions it. We can afford to pay more to American manufacturers rather than send our work abroad."

Food for the Fighting Forces

Agricultural America and hundreds of industries help feed the American soldier

by

Brigadier General A. B. Warfield

*Assistant to the Quartermaster General, United States Army**
and
Miss Gertha Lockard, Supply Division, OQMG

SINCE the beginning of time, no one subject has more thoroughly interested the mind of men, or engaged more of his activities for its production, than food. It is the one element essential to existence. Clothing and shelter are, of course, expedient and important, but human beings can and do exist with little clothing and men may dwell in caves or other shelter provided by nature. Wherever he may live, however, and whatever may be his occupation, he must have food.

To no class of citizens of the United States is the supply of food of greater importance than to the Army. That the physical and mental strength, the ability and the power of an Army are in large measure dependent upon this single element has been recognized by all nations from the earliest to the present time.

That the Army of the United States has not always been well and properly fed is not to be denied. The insufficiency of the food supply in earlier times, however, was in the greater number of instances, in quality rather than in quantity. In common with the rest of mankind, the Army, in the early years of its history, had no knowledge of the chemistry of food and the necessity for a diet comprising all the essential elements. The elements themselves were unknown and it was believed that the only necessity to be met was the supply of a sufficient quantity of whatever food could be furnished with the least effort and at the lowest cost. Experience in times of stress and developments in the science of nutrition, which have been closely followed by those who are charged with responsibility for the food supply, have placed the Army of today in the forefront among consumers of food products of every kind.

For a number of years the best minds of the nation have devoted time and energy toward the improvement and development of agriculture, industry and business in general. The Army has been one of the largest contributors to this end and one of its greatest contributions has been in the purchase of food.

The Garrison Ration

The garrison ration, which is the basis for the supply of food for the Army, comprises thirty-nine separate items embracing practically all classes of food products; fresh and cured meats, fowl, eggs, milk, butter, cheese, flour and other cereal products, fruits, vegetables, lard and lard substitutes, coffee, tea, cocoa, jam, sugar, sirup, vinegar, salt, pepper and other seasonings and condiments. When it is remembered that the organizations composing the Army are located at posts and stations in every section of the continental United States and in Hawaii, the Philippine Islands, Puerto Rico, Alaska and the Canal Zone, and that it is the policy of The Quartermaster General to purchase food supplies, so far as is practicable, in the section in which they are to be consumed, it will be readily understood how great and how widespread has been the contribution of this single activity to the business and industry of the nation.

To better visualize how widespread and how potential has been the influence of Army subsistence supply on production, manufacture and general business, it may be well to point out briefly some of the interests affected by Army requirements of certain articles.

One of the most important items of diet is bread. The supply of this important article reaches to the end of the flour, yeast, salt, lard, sugar and milk industries and back to the farm itself. The production and supply of flour alone involves flour mills, elevators, bag manufacturers, cloth mills, transportation facilities and farms. The flour must be converted into bread at the post, necessitating the installation of complete bakery equipment and the use of fuel.

Development of Canned Products

In similar manner it might be shown how the various canned products, such as meats and fish, fruits, vegetables, evaporated milk, jams, preserves and jellies, etc., affect the canning industry and other manufacturing and business interests. The art of canning itself was developed as a military necessity, being the direct result or outgrowth of the war plans of the French Republic in 1795, when a lack of fresh fruits and vegetables in diet of soldiers and sailors during the winter months produced a scourge of scurvy which aroused the government to the extent that an award of 12,000 francs was offered for an improved method of preserving food. It is not feasible to point out, within the scope of this article, the various steps in the development of this important industry or to indicate in detail the relationship between the Army and that development. It is only necessary to say that the demand of the Army for improvement of methods in order to insure production of articles less subject to loss through spoilage, supported by the volume of Army purchases, has been one of the most potent factors in the development of the industry and the popularizing of canned foods of all kinds.

The larger number of improvements in the canning industry have been made within the last seventy-five years and the increase in Army purchases has kept pace with these improvements. It is doubtful that any single class of consumers in the United States makes larger purchases of canned foods of all kinds than does the Army and it is incontrovertibly true that its insistence upon a higher degree of excellence in both the quality of the products and the method of preparation has tended to increase the popularity of this class of foodstuffs and has thereby contributed to the financial benefit of the industry.

Meat Packing Industry

A similar condition exists with reference to fresh meats and packinghouse products. In early days the Army bought much of its beef on the hoof, the slaughtering and cutting being done by Army butchers. With the general lack of knowledge of meats prevailing at that time, it is safe to assume that the quality of the beef supplied to the Army was often not the best. When the packinghouse industry was developed and scientific methods of slaughtering, cutting and preserving fresh meats came into existence, the Army was among the first to take advantage of this means of obtaining quality products at financial advantage and is today one of the largest consumers of packinghouse products in the United States.

It is not possible, within the scope of this article, to enter into a detailed comparison between the subsisting of the Army seventy-five years ago and that of today. One of the outstanding differences, however, is that pertaining to methods of supply. In the early days, responsibility for the food supply of an organization rested largely upon the organizations themselves, the mess sergeants dealing directly with sutlers, traders and independent agencies of all kinds. This situation was continued until comparatively recent years when action was taken to centralize purchases for all organizations on a post in one agency, the post quartermaster. This operates to the advantage of the organizations and insures a uniformity of supply. With the present system of inspection of and strict supervision over food supplies and the constant study with a view to perfecting this important phase of Army business it is not to be wondered at that the United States Army of today is supplied with better food at less cost than any Army in the world.

*General Warfield desires that acknowledgement be given to Miss Gertha Lockard, in charge of the Study and Research Section of the Subsistence Branch, Supply Division, office of The Quartermaster General, for the collection of material for this article.

The Development of The Inspector General's Department

Growth from Nine Inspectors General in 1863; Conception of Duty is Unbiased, Impartial and Impersonal Procurement of Facts for the Use of the Appropriate Commander.

by

Major General W. L. Reed

The Inspector General, United States Army

IN 1863, in accordance with legislation of 1861 and 1862, there were nine inspectors general in the regular establishment and such number of acting inspectors general detailed from the volunteer forces as was considered necessary. When the officers of the regular establishment were not assigned to one of the armies in the field, they were under the orders of the Secretary of War. Armies, army corps, divisions, brigades, geographical divisions and departments each had one or more acting inspectors general, usually selected by the several commanders, and all parts of the Army were subject to frequent inspections. In general, the scope of inspections and investigations was that prescribed by the Secretary of War or by the military commanders concerned.

During the interval between 1865 and 1874, the number, rank and duties of inspectors general varied considerably. However, in 1874 Congress declared that the inspectors general constituted a department and conferred the rank of brigadier general on the senior inspector general. The inspector General's Department has functioned as a department since that date.

Inspections Required

IN 1874 Congress passed a law which required regular periodic inspections of all disbursement of Army funds.

Prior to 1879 the inspection system was centralized in the War Department, and all divisional and departmental inspectors general reported, through regular channels, to The Inspector General. In 1879 the Secretary of War directed an inspection of every post, station and command of the Army by division and department inspectors under the direction of their respective commanders, and this may be regarded as an early appearance of our modern conception of decentralization.

In 1883 Congress passed a law requiring The Inspector General of the Army in person to make an annual inspection of the Soldiers' Home.

By 1895 the Inspector General's Department was charged with the annual inspection of the entire military establishment with the exception of public works under engineer officers, and in this year the system of decentralization of inspection was temporarily abandoned, and an inspector was appointed for each of the six newly created inspection districts. These inspectors were under the direct control of The Inspector General and were virtually independent of the department commanders. This system was in effect during the early stages of the Spanish-American War, but in 1898 it was found necessary to return to the system of departmental inspection, and this system has been followed ever since.

Detail System Installed

After the Spanish-American War the detail system for providing additional personnel for the department was put into effect, and during the period prior to the World War the major portion of the personnel was procured by detail from the arms and services.

The entry of the United States into the World War in 1917 found the Inspector General's Department far below the strength necessary to accomplish the greatly enlarged inspection duties that devolved upon it and in December, 1917, the War Department increased the authorized strength of the department and provided for additional acting inspectors general where necessary.

In the A. E. F. it was eventually found desirable to establish an Inspector General's Department at both General Headquarters and Headquarters Line of Communication (later Service of Supply), as well as to detail inspectors general on the staffs of armies, corps and divisions.

The manner in which the heavy responsibilities of the Inspector General's Department were met during the World War is, perhaps, best expressed by General Pershing in his final report, where he stated:

> "The Inspector General's Department, acting as an independent agency not responsible for the matters under its observation, made inspections and special investigations for the purpose of keeping commanders informed of local conditions, and the inspectors worked unceasingly to determine the manner in which orders were being carried out in an effort to perfect discipline and team play."

The Inspector General has had the rank of Major General since October 6, 1917. In 1920 the Army was reorganized, and since that time the Inspector General's Department has consisted of one Inspector General with the rank of Major General and approximately forty officers in grades from colonel to captain, inclusive, detailed from the arms and services. Eight inspectors general are detailed to the Office of The Inspector General to assist him in the performance of his duties, and those remaining are detailed on the staffs of the commanders of the corps areas, departments, and active divisions. Detail in the Inspector General's Department is made entirely by selection, and only those officers possessing outstanding qualifications are considered when selections are made.

Today the general mission of the Inspector General's Department is to inquire into and report upon all matters which affect the efficiency and economy of the Army and to make such inspections, investigations and reports as may be prescribed by law or directed by the Secretary of War.

Fact Finding Agency

The Inspector General's Department is, essentially, a fact-finding agency, and its existence places at the disposal of the Secretary of War, the Chief of Staff of the Army, and corps area, department and division commanders a group of experienced, trained, and disinterested officers. These officers are available to inquire into and report upon, with strict impartiality, the facts concerning any matter referred to them for inspection or investigation. The freedom of these officers from any personal responsibility for the matters inspected and reported upon gives them an impartial and independent point of view. Under our military system of centralized direction and decentralized operation, an independent service of inspection is needed by higher commanders to insure that governing laws, regulations, orders and policies are being complied with throughout their commands.

In the seventy-five years since 1863, the Inspector General's Department has varied in composition and scope of duties in accordance with the situation in which the War Department has been placed, but it has not departed from its conception of its duty, which has always been the unbiased, impartial and impersonal procurement of facts for the use of the appropriate commander.

Coast Defenses of the United States

by

Major General A. H. Sunderland

Chief of Coast Artillery, United States Army

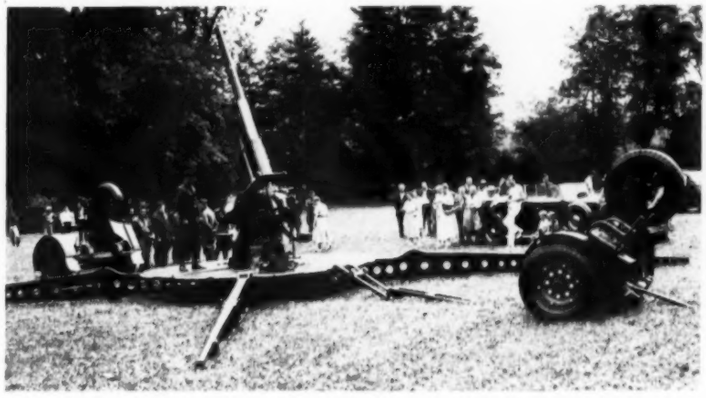
WHEN the first issue of the ARMY AND NAVY JOURNAL came off the press in 1863, a large number of fine old forts provided the nation's coast defenses. Measured by the standards of the day, and the duty required of them, these forts were adequate and their armament was up to date. They protected the length of our coastal frontier from Popham Beach on the Kennebec to Galveston on the Gulf, and some looked out over the waters of the Pacific. A few were in the hands of the Confederates, for in 1863, the Confederacy had reached the zenith of its power.

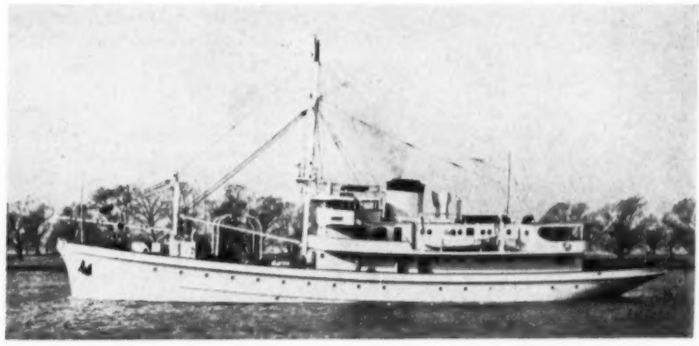
In whatever hands they were, these coast defenses served well the side that manned them; and we can be sure that the sleep of many a citizen was sounder for the knowledge that his home had their protection. We can also be sure that a proposition to save money by economizing on fortifications would have met with an instant and vehement protest—there is nothing like war to make people want the best in defense. It was not necessary to convince the citizen of seventy-five years ago that his fortifications had justified the original cost of their installation, for he had proof positive of a satisfactory return on the taxpayers' investment. The Civil War defenses had stood the trial of war, which is, after all, the only true test of military equipment.

For thirty years after the Civil War our coast defenses—like the rest of the Army—lapsed into innocuous desuetude. The shock of the Spanish War, however, again made the country defense conscious; and it was rather unpleasant to discover that the coastal defenses were about in the same shape that they were on the day that Grant and Lee sat down in the little house at Appomattox.

For example, at San Diego in the summer of '98, a red-legged lieutenant lay on his belly and sighted down the "line of metal" of an old smooth-bore pointed in the general direction of what purported to be a Spanish cruiser. Long before the vessel got within range, field glasses revealed her to be an inoffensive United States revenue cutter, and again the Coast Artillery did not make a poor score. Such an incident could not happen today. For one thing, the incoming vessel would have been identified long before any one ashore would have seen it. Moreover, instruments would have tracked her until she came within range; and, generally speaking, the men actually firing would not even have seen the ship.

Just as the Civil War brought the realization that coastal defenses are a vital part of the country's protection, so did the Spanish War drive home the fact that it is necessary for fortifications to keep step with the times. In this case, keeping step actually meant that harbor defenses should keep one step *ahead* of naval progress—the rifled cannon and modern steel-plate armor had made a formidable weapon out of the battleship which is a floating fort. The introduction of modern armor made smooth-bores virtually useless, and the powerful projectiles of rifled guns called for a fort of considerably more strength than that afforded by brick and mortar.





In addition to its fixed and mobile heavy artillery, the Coast Artillery Corps also is charged with anti-aircraft artillery such as the modern 3-inch type shown above, and with the Army mine planter service which operates vessels of the type shown below.

Millions of dollars were spent immediately after the Spanish War to bring our coastal defenses to the standard necessary to maintain our national prestige and safeguard our material possessions. Our emergence as a world power had brought with it additional problems of protection for naval bases, coaling stations, and the strategic harbors vital to our insular possessions. All key localities received elaborate fortifications, and at the time of their completion these strong points represented the best harbor defenses in the world.

The fixed defenses constructed as a result of the public pressure after the Spanish War are still of value today. There has been no great change in gun building or the application of ballistics since the introduction of the built-up gun and slow-burning powder. The essence of a harbor defense is still the gun power it can bring to bear at the critical point, and there is considerable latent power of this kind in our defenses.

Although modern coast defenses are justly feared by an enemy fleet, the friendly navy finds them a welcome protection. The harbors they protect are a haven for the fleet, where it may refit, go through routine training, or await a favorable day for a sally against the enemy. The prime importance of harbor forts to a navy is aptly illustrated by the history of Heligoland during the World War. As long as Heligoland flew the German flag, the frontiers of the Reich were secure against assault; and the German Navy remained a fleet in being to the end of the war, and as a corollary, limited 90% of Britain's sea activity to the narrow confines of the North Sea.

Singapore and Gibraltar now furnish the protection for the vital links of the British Empire. However, the true value of these harbors is found not only in their facilities for dry-docking and refitting battleships—it is found in the haven provided by their artillery—coast and antiaircraft. Paradoxical as it may seem, it is extremely doubtful that Singapore or Gibraltar will ever find it necessary to exchange shots with a hostile fleet—a battle won without firing a shot is a profitable battle.

Today, the activities of our Coast Artillery Corps differ widely from those of '98 and the twenty years following. The World War proved that the gunners could leave their forts and go into the field as mobile artillery—and they have not lost that mobility. If anything, they have found it necessary to increase it.

Moreover, the advent of the airplane as a

(Continued on page 104)

Athletics at the Service Academies

by

Captain Garrison H. Davidson, CE, U. S. Army

Formerly Head Coach, Football, U. S. Military Academy

IT is difficult for anyone accustomed to our present-day Army-Navy game, and its spectacular display, to picture a life stripped of all such activities. Organized sport is such an integral part of our daily life that we assume it has always been so, that there has always been some such physical and emotional climax to a sport season. Consequently we are amazed to find that from prior to 1863 and up to 1890, one of the principal sports enjoyed at West Point was marbles, and even that was played under great difficulties.

Life would have been very boring and rigorous to the present healthy specimen of cadet. West Point was founded to provide instruction in engineering for a few of the officers. Further than that it was imbued with chivalric tradition and rigid standards of propriety. It was thought to be undignified to participate in competitive sports. Dress coats were required at all times outside the cadet area, even while participating in games. Cadets were never permitted to "unbend." With the authorities possessing such beliefs athletic activities were naturally throttled.

In the early years a certain amount of military gymnastics and compulsory outdoor drill existed. Games, however, were played as the cadets fancied, with an occasional inter-class competition. Cricket, baseball, boating, and football made various and peculiar appearances. All contests were sporadic in occurrence, but, nevertheless, amazingly persistent in the face of deadly restrictions. Tackling "Clint" Frank in a stiff collar would jar a great deal of enthusiasm out of the most aggressive fullback. Small wonder that marbles was a popular outlet. Such were conditions until 1890, more than ten years after organized athletics had become an important factor in eastern college life.

That year several developments took place to inaugurate the present-day program of athletic activities. There is record of an old scorebook of a game that year between the classes of 1891 and 1893. In the summer there were several organized baseball games with "The Merrimans" of Philadelphia, "The Sylvans" of New York, and "The Atlantics" of Governor's Island. More indicative of the change in attitude toward athletics, however, was the first Army-Navy football game.

In the fall of 1890 Navy challenged Army to a game of football. Remarkably, the acceptance of this challenge was approved. Some change in the attitude of the authorities, some willingness to permit the cadets to "unbend" must have crept into the official opinion. Perhaps the place attained by the new type of activity in other colleges had been noted. Or, perhaps an Admiral and a General had been exchanging derogatory remarks and doing a little incidental and most comforting boasting. Whatever the cause, Navy's challenge was accepted and Michie and Prince hurried to organize a team. The first game was played November 29, 1890 attracting mild interest and few points for Army. In fact the end of the game found Army still anchored to the zero tally with Navy sailing gaily along on a 24 point breeze. Defeat, however, was better for the new activity than victory; for it served to arouse such interest that the following year Michie and his comrades, spurred on by many awakening enthusiasts, administered a similar defeat to the midshipmen.

From that time on developments were rapid and uninterrupted. Authority fostered sports rather than hampered them, and either permitted or instigated the organization of an Army Officers Athletic Association in 1892. Later a Cadet Athletic Association was formed.

By 1902 the major sports of football, baseball and track were well organized and supervised, as well as the minor sports of fencing, tennis, polo and golf. Sports were then definitely a major part of cadet life, organized with coaching staffs and instructors. Later developments were only establishments of new sports and expansion of old ones, so that today's program of athletics at West Point is one of the most complete of major sports programs. The major sports program now comprises football, baseball, track, (*Continued on page* 115)

by

Captain E. W. McKee, U. S. Navy

Head of the Department of Physical Training, U. S. Naval Academy

DURING Civil War days the Naval Academy was transformed into an Army hospital while the village of Annapolis served as a mule exchange. With the coming of peace a small group of past-midshipmen under Admiral Porter returned to the Naval Academy. To their surprise they found an academic routine handed down from an earlier decade, so strict and limited that recreation was impossible within the walls of the reservation. The first reaction of the wartime midshipmen after returning to the Academy was to assemble in taverns entirely too small and smoky to accommodate their outbursts of physical energy. A retired officer writing of similar conditions at West Point stated: "It was truly pathetic, paralleled only by very similar outbursts among soldiers of the Civil War."

Summed up in brief, it took the Civil War to break up the old order of things and with it a much needed athletic system was established at both Service Academies—West Point and Annapolis.

* * *

Between the Civil War and hostilities with Spain the Navy's Athletic program developed rather slowly. Although football games between the two schools began in 1890 the series was marked by unscheduled interruptions. In this period teams were forced to travel on funds subscribed by interested officers and their own classmates. Added to this the Regiment was small and hard pressed to provide even a few capable substitutes for the first teams.

Once again it was war that changed the situation. Following 1898 a plan of financial relief for the widows and orphans came up for consideration. Community bazaars and rummage sales yielded the usual eight to fifteen dollars, a scant sum for even one orphan. These methods failing it was decided to let the athletes try their hand at solving the problem. The result was an Army-Navy game to which admission was charged, an impressive share going to relief agencies of the Spanish-American War. In solving relief, the athletic teams also found a way to become self supporting and provide equipment for expansion.

* * *

The World War greatly broadened Navy's athletic program. For the first time teams were entered in world-wide competition such as the Olympic games of 1920 where a Navy crew won America's first rowing championship. In 1926 Navy was declared the National Champions in football and in 1938 gained National championship in lacrosse.

* * *

Although the public turns its spotlight upon the intercollegiate phase of athletics, it is in the intramural branch that the garden variety of competitor finds recreation. Recognizing this fact, the Naval Academy has gone to long lengths to develop a system of battalion athletics that now fully measures up to the finest organizations in the country.

With the passing of 75 years, in which period Service athletics came into being, the most recent developments at Annapolis are towards improving facilities for the entire Regiment rather than limiting interest to the selected few who comprise the first teams. Good first teams like good guns are still necessary to hold the fighting front. Without inspired first teams there would be no seconds and a very weak intramural program—if any.

The enlarged scope of work for Service teams, beginning with this year, is clearly shown by the concluding schedule in which Army and Navy will meet in 12 sports:

Baseball, May 27 1939, at West Point. Basketball, Feb. 25, 1939, at Annapolis. Cross-Country, Oct. 22, 1938, at New York. Fencing, Mar. 4, 1939, at Annapolis. Football, Nov. 26, at Philadelphia. Golf, May 27, 1939, at Annapolis. Gymnasium, pending. Lacrosse, May 27, 1939, at Annapolis. Soccer, Nov. 23, 1938, at West Point. Swimming, Mar. 18, 1939, at Annapolis. Tennis, May 27, 1939, at Annapolis. Track, May 27, 1939, at West Point.

Major General Winship, Governor of Puerto Rico, Makes Island a Paradise for Tourists and Promotes Industrial and Social Welfare

by

Colonel Luis R. Esteves

Commanding Officer, Puerto Rico National Guard

THE sun was shining and the Stars and Stripes were passing the reviewing stand at Ponce under a blue Puerto Rican sky. Native troops of the 65th U. S. Infantry, in smart khaki, passed in parade saluting Governor Blanton Winship and other Insular Government officials.

Occupation Day was being celebrated and many thousand loyal Americans—all that could crowd into the plaza of the city—were there to hail the landing of the American forces on another July 25th, 40 years before, when this beautiful tropical island was wrested from the grip of Spain with the acclamation of the oppressed populace. The cheering crowd, the uniforms and the martial music, pleased Governor Winship, himself an army man and a retired Major General, with the Distinguished Service Cross among his many decorations.

He was recalling to friends on the reviewing stand that the crowd of loyal Americans, assembled that day in Ponce, was nearly as large as the huge crowd that had turned out to witness the July 4 celebration, despite a torrential rain, in San Juan only three weeks before. It was at this happy moment that the group of crazed terrorists fired the shots that were heard around the world and crystallized public opinion in Puerto Rico against Nationalistic violence.

The details of the Ponce incident have been emblazoned upon the front pages of every newspaper in the world. What has not been written is that the seventy-five or more shots that were fired at Governor Winship, and other prominent officials of the island, has resulted in the past ten days in demonstrations of loyalty to their Governor by native-born Puerto Ricans, never equalled in the 400 years history of the island.

Even the most ardent supporters of independence for Puerto Rico have hastened to publicly protest the action of an insignificant group of terrorists who fired, without regard for human life, into a large crowd, in which there were many women and children. A wave of revulsion has swept the island because of the killing of Col. Luis Irizarry, a distinguished National Guard officer; wounding of more than 30 persons, many of them the island's most prominent citizens, and the attempted assassination of the Governor.

Governor Winship escaped with his life only because loyal native-born Puerto Rican aides threw him to the ground and shielded him with their own bodies. Despite their spontaneous protection the Governor found later that a bullet had pierced his trouser leg.

It was characteristic of Governor Winship that his first remark after the shooting was:

"What damned poor shots they are!"

And it was characteristic of him that he ordered the parade to proceed and insisted on carrying out his regular schedule by later raising a flag at Guanica, near the spot where the American troops landed during the Spanish-American War. That night he visited the wounded in Ponce hospitals.

Maj. Gen. Blanton Winship, Governor of Puerto Rico.

It was characteristic of him, too, that no reprisals followed the Ponce incident although 99 per cent of the populace, who live peacefully and proudly under the American flag on the island, were unanimous in insisting that Nationalistic violence must be stamped out at any cost.

Governor Winship treated the Ponce incident as he has treated every emergency that has arisen during his four years as Governor of Puerto Rico—calmly and effectively. In Puerto Rico he is regarded not only as a dignified military man but as a kindly civilian governor.

Emergencies—and there have been many—have been handled by the Governor himself without resorting to a call for troops. Strikes, and uprisings of the small group of Nationalists, have been controlled by Governor Winship and his Insular Police, of whom he is justly proud. Strictly trained under the Governor's own tutelage, his police force is one of the most effective under the American flag.

One of a long line of distinguished forbears who first appeared in America, in the 17th century, Puerto Rico's governor was born in Macon, Ga., in 1869. He received his A.B. and LL.D. degrees from Mercer University and his LL.B. degree from the University of Georgia. He entered the army in 1898, served in the Philippines, Cuba, Mexico and Europe. He was awarded the Distinguished Service Cross for extraordinary heroism in action near Villers-sur-Fere, France; the Distinguished Service Medal and the Legion of Honor.

(Continued on page 133)

Governor Winship addressing members of the Citizens' Military Training Corps at Camp Buchanan, Puerto Rico.

Military Powder

The Agent of Long Range on the Battlefield

MILITARY powder as we know it today was in its infancy when the ARMY AND NAVY JOURNAL made its first appearance seventy-five years ago. One must look to the deeds of heroism on the battlefields of the Civil War—ashore and afloat—and compare them with the agents of modern industry, especially of modern chemistry, to draw a parallel between the powder of 1863 and that of 1938. In the days when the JOURNAL was born, history was being made by innumerable deeds of personal valor and heroic military achievement—with black powder.

In the very year of the JOURNAL's birth the field of Gettysburg furnished heroism which is difficult to overstate. On July 1st of that memorable year at the beginning of the battle, the famous Sixth Corps of the Federal forces was thirty-two miles away at Manchester when the order came to proceed to Gettysburg. Knowing the reputation of the Vermont troops for marching, Gen. John Sedgwick gave his famous order, "Put the Vermonters ahead, and keep the column closed up!" Led by the 172nd Infantry, the Corps covered thirty-two miles in one day—one of the most remarkable forced marches in military history. As mechanization today reduces this feat to the achievement of one hour or less, so modern military propellants have increased the fire power of the rifleman almost as much.

Or again, coincident with the JOURNAL'S birth, probably no heroic exploit of the Civil War exceeds that of Lt. William B. Cushing, USN, when he sank the Confederate ironclad "Albemarle." Day after day this strange looking vessel played havoc with the Federal gun boats in the inland waters of North Carolina. At night she was protected by a boom of logs strung across the river below her moorings. With a torpedo rigged on the end of a spar, Lieutenant Cushing crept up the river at the bow of a light steam launch. Under a hail of bullets from sentinels, he charged the log boom, drove his torpedo against the side of the ironclad and pulled the trigger. Military propellants today would make the job easier but none the less heroic. Again, the historic battle between the Kearsarge and the Alabama, which ended the career of the Confederate commerce destroyer, furnished an opportunity for the comparison of American and English powder. The charges for the Kearsarge's guns were manufactured by the DuPont Company, those of the Alabama by English manufacturers. Semmes, commanding the latter, found his powder ineffectual because of dampness, that of the Kearsarge was dry and powerfully effective. At the period of this battle the records show the use of DuPont powder on other Union ships. That same powder, although not so highly developed, was employed in the little fleet which under Commodore Perry won the battle of Lake Erie in 1914.

These exploits came at the beginning of the JOURNAL's career and at the end of what might be called the black powder era of powder development. Discovery of gun cotton by Schoenbein really had its first application in the Army of the United States in 1846 when Capt. Alfred Mordecai, Ordnance Department, first tested it at the Washington Arsenal, the present site of the Army War College. Mordecai, using Schoenbein's formula, obtained a mean velocity of 1670 f. s. in 17 rounds using 60 grains whereas 48 rounds fired with 120 grains of "good musket powder" gave a velocity of only 1600 f. s. Two ounces of gun cotton burst a 32-pounder shell into many fragments! Reporting on these tests, Lt. Col. George Talcott of the Ordnance Office, in a report dated November 10, 1847, wrote, "Gun cotton, the knowledge of which had just reached this country at the date of my last report, has been submitted to experiments to test its fitness as a substitute for gun powder. The limited trials made have not shown it well adapted to use in fire arms. Its explosive force, or bursting effect, is far greater than that of gun powder; its nature, in this respect, assimilating more to that of fulminates, a property which seems well suited to mining purposes."

Twenty years later, in 1877, another report was made on gun cotton in which it was said that in the light of experiments, gun cotton is far more effective than gun powder for shells and rocket heads, but it was not suitable as a propellant. It was another ten years, in 1888, when Vielle's invention of smokeless powder was heralded from Europe that the then Chief of Ordnance, Brig. Gen. S. V. Benét, reported "the results obtained in France with the Lebel rifle seemed to point to a radical innovation in the manufacture of powder for small arms."

Then began the series of experiments in which the names of DuPont, Maxim, Nobel and Munroe figure prominently. On November 4, 1894, the Army invited bids of 10,000 pounds of smokeless powder for the caliber .30 rifle and issued its first set of specifications which were general in terms. However, before final decisions as to type could be arrived at, the Spanish-American War intervened. During this period the Army used only brown prismatic powder for its guns. During these experimental days the youthful powder industry of the United States was doing its best to co-operate with both the Army and the Navy. The DuPont Company, begun in 1802, was a particularly valued source of cooperation.

Mention should here be made of the successful efforts of the Ordnance Department to obtain an experimental powder factory of its own. Its efforts of many years were finally successful in 1906 when Congress appropriated $165,000 for a plant with a capacity of 1,000 pounds of powder a day to be established near Wharton in northern New Jersey. The land had been bought in 1880 and a powder depot was located on the tract—a site of a forge which had been in existence as early as 1749 where work for the Army had been done during the Revolution. Picatinny Arsenal today is the Army's principal research establishment for powder development and production.

Finally the World War history of smokeless powder is replete with the tremendous demands for propellants far beyond the capacity of Government and private plants then in existence. The program contemplated the erection of two Government-owned factories with a combined capacity of 1,500,000 pounds of powder a day. Thanks to the engineering and administrative ability of the DuPont Company, one of these plants was successfully built at Old Hickory, near Nashville, Tenn., on the Cumberland River. Construction was started in March, 1918, and the first powder was granulated in September of that year. The plant was built and came into production of units of 100,000 pounds capacity each. At the time of the Armistice it was producing 500,000 pounds daily—an achievement of high military importance. The other plant was built near Charleston, W. Va., under the direction of Mr. D. C. Jackling. It was most efficiently operated by the Hercules Powder Company and at the time of the Armistice it was turning out 175,000 pounds of smokeless powder a day although the construction of the plant was only 60 per cent complete. After the war both plants were dismantled and most of the equipment sold.

In the development of propellants, Naval ordnance, too, has been active throughout the years. It has its own factory located at Indian Head, Md., and there, by research, by cooperating with the Army and with private manufacturers, progress has been made to obtain the efficient propellants which are in use today.

The situation today regarding propellant powders for the national defense of the United States is on all fours with other items of equipment used by our Army and Navy. From an engineering standpoint the chemistry of smokeless powder is the story of rapid evolution of research and development. Our powders today developed to meet various ballistic demands can be said to equal in chemical characteristics the very best of which the chemical engineering profession the world over is capable. Long ago our military powders became smokeless, then flashless and finally the third quality has been added of nonhygroscopicity. Moisture, the old enemy of stability and long life, has finally been eliminated from the powder. Indeed no longer can the injunction "keep your powder dry" be compulsory for underwater storage is today entirely feasible. For these successes both Government and private industry are jointly responsible. Government arsenals are

(*Continued on page* 130)

The adjoining map illustrates the division of the States into War Department Procurement Zones. Figures of commercial production for 1929 show that 36 per cent of such production was in Zone I, 46 per cent in Zone II, 11 per cent in Zone III, and 7 per cent in Zone IV. Under present plans the distribution of allocated facilities in those zones is as follows: Zone I, 39 per cent; Zone II, 50 per cent; Zone III, 8 per cent; and Zone IV, 3 per cent.

Typical production from industrial centers particularly important in a national emergency is as follows:

BIRMINGHAM, ALABAMA—Steel Center.
Artillery Shell.
Forgings for Artillery.
Phosphorus.

BOSTON, MASSACHUSETTS—Center of Shoe and Wool Industries.
Leather and leather products—shoes.
Shoe Machinery.
Wool.
Textiles.
Textile Machinery.
Instruments for controlling artillery fire.
Searchlights.
Shipbuilding.
Ship-propulsion units.
Precision instruments.

BRIDGEPORT, CONNECTICUT. (Waterbury, Hartford, New Haven)—Brass Center.
Rifles and machine guns.
Small arms ammunition.
Fuzes for artillery ammunition.
Brass components for artillery ammunition.
Precision instruments.
Wire.

CHICAGO, ILLINOIS — Commercial Communications, transportation and miscellaneous heavy and light manufacturing center.
Electrical communication equipment.
(Telephones, radio, etc.)
Artillery and artillery ammunition.
Tanks, armored cars and tractors.
Railway equipment.
Meat packing center.
Clothing.

CINCINNATI, OHIO—Machine tool center.
Machine tools for factories, laboratories, arsenals, etc.

DETROIT, MICHIGAN—Automotive center.
Automobiles and trucks.
Special motor vehicles.
Tanks and military cross-country vehicles.
Tractors and trailers.
Airplanes—Large scale production in time of war.
Artillery ammunition and artillery.

LOS ANGELES, CALIFORNIA—Aviation and Moving Picture Center.
Airplanes and aeronautical accessories.
Moving pictures.

NEW YORK, NEW YORK—Financial, mercantile and Ocean Shipping and trading center.
Clothing—Textile cutting-up plants.
Light manufacturers—miscellaneous.
Raw material import center for rubber and tin.
Shipbuilding.
Pyrotechnics.
Fuzes for artillery ammunition.
Searchlights.
"Iron Pilots" (Devices for keeping ships or aircraft on a predetermined course).
Electrical appliances.

PHILADELPHIA, PENNSYLVANIA—Center of diversified manufacturers. (Heavy and light), shipping and trade.
Locomotives and Railway Cars.
Artillery and artillery carriages.
Artillery ammunition.
Armor plate.
Radio equipment.
Clothing.

PITTSBURGH, PENNSYLVANIA—Steel Center.
Artillery.
Artillery ammunition.
Armor plates.
Iron and Steel for manufacturing in other industrial centers —
Billets (Forging and Rolling).
Wire Rod.
Flats.
Structural Shapes.
Glass for use in other industrial centers.

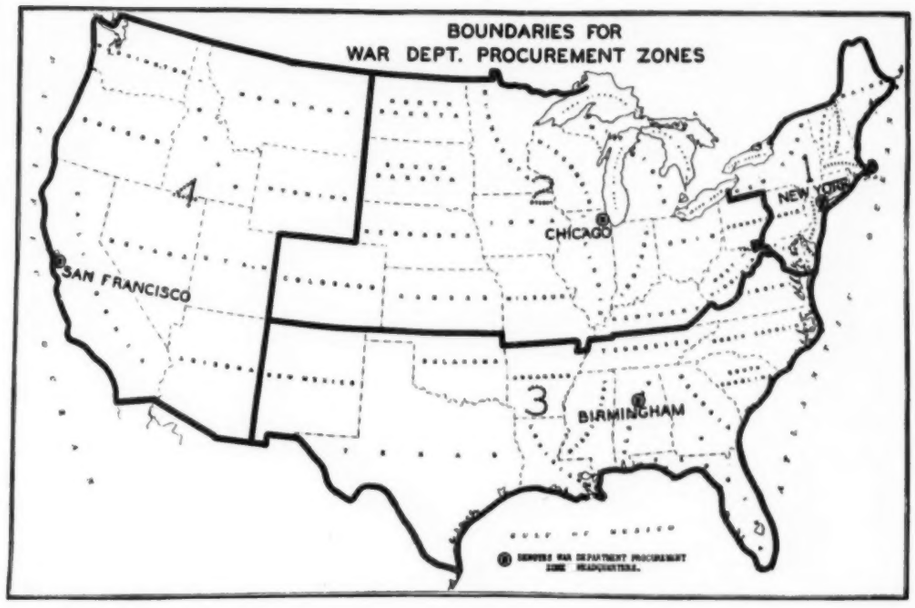
ROCHESTER, NEW YORK—Optical glass and Optical products center.
Optical lenses and prisms.
Fire control devices.
Photographic appliances and supplies.
Telephone and radio production.
Small arms (Rifles, machine guns, etc.).
Precision instruments.

ST. LOUIS, MISSOURI—Chemical, leather and manufacturing center.
Chemicals—
Heavy
Intermediate
Medicinal
Laboratory
Small arms ammunition and artillery ammunition.
Explosive chemicals.
Shoes.
Leather equipment, other than shoes.

SAN FRANCISCO, CALIFORNIA—Commercial and shipping center.
Shipyards—fleet maintenance.
Light manufacturers.
Artillery.

SCHENECTADY, NEW YORK — Electrical appliances and generating plant equipment center.
Electrical generating units, steam and water power.
Electric railway locomotives.
Radio equipment.
Searchlights.
Artillery ammunition.

WILMINGTON, DELAWARE — Chemical production center.
Chemicals and synthetic products.
Plastic moulding compounds.
Synthetic fibres.
Synthetic rubber.
Chemicals for production of explosives.
Powder for small arms and artillery ammunition.
High explosives.



Planning for Use of Industries in Emergency

UNDER the direction of the Office of the Assistant Secretary of War work is continually going forward on the task of insuring timely and orderly production, fabrication and supply of materials required in a national emergency.

It is difficult to conceive of any large industry which does not, in some way, play a part in sustaining the Army and Navy in any possible war effort. Under the National Defense Act and the provisions of the Industrial Mobilization Plan, approved by the Secretaries of the War and Navy in 1936, a carefully worked out system is in operation in peace time to assure the effective utilization of industry in time of war. An important phase of this activity is the allocation system under which complete records are maintained of the firms willing to undertake war work, their strength in skilled and other labor and in production capacity, and the items and amounts which they have indicated a willingness to produce in an emergency. There are today about 10,000 firms cooperating under this set-up.

Throughout the four War Department Procurement Zones illustrated on the above map are stationed 49 representatives of the supply arms and services, whose task it is to keep in constant touch with the firms in their districts with a view to keeping the allocations up-to-date and up to the probable war needs. Each of the supply arms and services work with their representatives on this duty and the results in turn go to the Planning Branch of the office of the Assistant Secretary of War and its Allocation Division where they are coordinated to prevent the various agencies from conflicting and thus overloading any facilities.

There are listed below the principal war load, in items, by industries, so that it may be seen how far reaching the national effort would have to be in an emergency:

Industry	*Items*
Iron and Steel	Armor plate, guns, projectiles, automobile and railroad equipment, bridge equipment, construction materials, barbed wire, metal components for ammunition, gas cylinders.
Automotive	Armored cars, combat vehicles, tanks, cargo vehicles, passenger carrying vehicles, caissons, limbers, reels, field laboratories, electrical plants and special technical vehicles and tractors. Artillery and artillery ammunition. Airplanes.
Aeronautical	Aircraft and aircraft parts and instruments.
Explosives	Bombs and grenades, cartridges, fixed ammunition, fuzes and fuze parts, mines, artillery projectiles, chemical projectiles, pyrotechnics, torpedoes.
Chemical	Acids, alcohol, medicinal chemicals, nitrates, wood distillates, dyestuffs, potash and products.
Textiles	Blankets, tentage, flags, surgical dressings, uni-

(*Continued on page* 133)

The Navy's Contribution to the Construction Industry

by

Rear Admiral Ben Moreell, (CEC), U. S. Navy

Chief of Civil Engineers and Chief of the Bureau of Yards and Docks, U. S. Navy

THE Bureau of Yards and Docks is charged with the design and construction of the public works and public utilities of the naval shore establishment and, except at certain of the shore stations, their maintenance and repair. Some idea of the magnitude of this task can be obtained from the fact that the present-day replacement value of the Navy's shore establishment is estimated at approximately one billion dollars.

In many instances the Bureau's work has been of a pioneering nature. The advances in scientific and industrial processes during the past three decades have carried the country forward in a wave of progress of unprecedented proportions. Nowhere is this progress more marked than in the instruments of modern warfare and its appurtenant structures. The progress of engineering, especially as applied to naval shore facilities, has been marked by constantly changing designs and methods of construction. The result is evidenced by intricate and gigantic engineering structures comprising shipbuilding plants, industrial and storage facilities, power plants, hospitals, training stations, air stations, dry docks and marine railways, barracks, fuel storage, radio stations, ordnance plants, submarine bases, and miscellaneous facilities of many kinds. It is believed that there are not included elsewhere under any one organization the widely varying engineering problems which are presented to the Bureau of Yards and Docks and for which an effective solution is essential to assure proper construction, equipment, maintenance, and repair of the Fleet and its appurtenances.

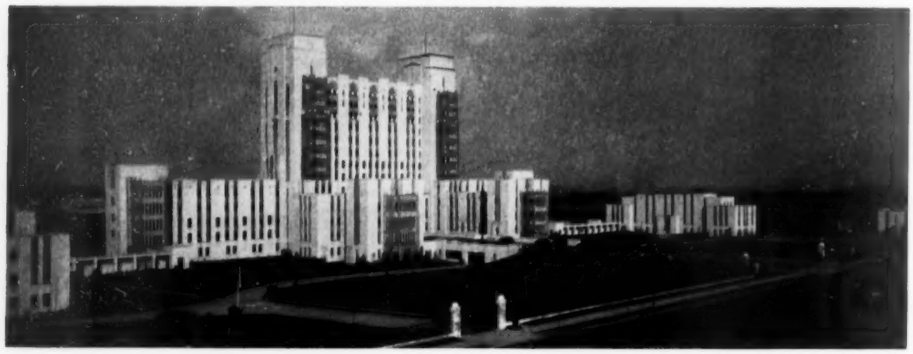
For the economical construction of naval public works, the Navy is dependent, in large measure, upon the construction industry. In its broadest definition, that industry includes the production of raw materials, fabrication and transportation of the finished products, and the final assembly of all the elements into a finished structure. Fortunately, the construction industry is now well organized and is adequately equipped to render expeditious and efficient service on naval shore construction. Many of the Navy's important construction problems have been brought to a happy solution in cooperation with construction companies who have had experience in the specialized fields involved. The transition from peace to war conditions increases the demands upon the construction industry. The scattered locations of the naval shore activities embracing the continental United States, Alaska, Panama and the Island possessions in the West Indies and in the Pacific have necessitated the transporting of construction organizations and materials over long distances.

There is no question but that the Navy's demands for quick and efficient service under the most trying conditions, involving in many cases explorations into new fields and along previously untrodden paths, have stimulated the development of both personnel and materiel of the Nation's construction industry. It is rarely, indeed, that the industry fails to measure up to the Navy's expectations. In fact, it occurs so frequently as to be almost a rule that the industry goes far beyond our demands for efficiency, expedition, and economy of construction.

To the extent, therefore, that the Navy has stimulated this development in the construction industry, it has contributed effectively to the improvement of the country's productive capacity and, therefore, to the Nation's preparedness for an emergency.

It is not generally recognized that any major emergency calls for an immediate expansion of the Navy's shore facilities which is a condition precedent to the expansion of the forces afloat. Existing training stations must be expanded and new stations established; ship repair and building plants, docking and berthing facilities, hospitals, storehouses, ammunition depots, air stations, and many special structures must be provided with a minimum of delay. It is especially at such times that the efficient organization, the highly trained personnel, and the specialized equipment of the construction industry receive the recognition which they deserve. Without such an industry it would be impossible for the Navy to meet its vital defense obligations. Be it said to the credit of the American construction industry that it has never failed to meet the Navy's needs. It has been our experience that the industry does not ask for nor expect anything more than a fair deal; and even when this is not obtained, the industry has not hesitated to put its shoulder to the wheel with a good will when the Nation's safety is at stake.

(Note.—The opinions or assertions contained in the foregoing article are the private ones of the writer and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.)



Upper: New Navy Hospital at Philadelphia;
Lower: Hangars at Naval Air Station, Pensacola, Fla.

Construction in the U. S. Army

Army Housing, now worth $500,000,000, needs $300,000,000 additional; lumber, cement, steel, and other structural materials as well as general construction industries contribute to program.

by

Brigadier General A. Owen Seaman

Assistant to the Quartermaster General, U. S. Army

SEVENTY-FIVE years ago the ragged, gray-clad legions of the South were retreating sullenly from their defeat at the crucial battle of Gettysburg. The Confederacy was definitely on the way to its last stand two years later at Appomattox.

Throughout this four-year struggle between the States neither side undertook for military purposes any great amount of general construction. The activities of the South in this line were limited chiefly to field defenses constructed mostly of earth and logs. The Northern contribution to construction activity consisted mainly of vessels and forts. The war strategy of the North called for a blockade of Southern ports, which required a large number of vessels and entailed a corresponding activity in the Northern ship yards. These vessels consisted mostly of wooden types, steel ship building being still in its infancy. A number of forts, principally in the vicinity of Washington, were constructed. These forts, however, were little more than overgrown field fortifications and neither they nor the ship building program represented any especially heavy construction activity for a nation numbering thirty million people and rich in natural resources.

Other industrial activities during the period were limited principally to the production of food, clothing, munitions and military equipage, while most peace time construction industries fell into desuetude as is usual in war emergencies.

Between the Civil War and the outbreak of the Spanish-American, a stretch of about thirty-three years, Army construction dwindled until it became of little more than nominal importance. Limited appropriations by Congress from time to time made possible some improvements on Atlantic Coast stations, involving principally concrete and masonry, with only a relatively small proportion of wood.

During this period a number of new stations were established in areas pertaining to the old Western Frontier. These forts constituted home stations for detachments guarding the frontier against Indian depredations, and were constructed complete with barracks and quarters, stables, warehouses, shops and other essential facilities.

As these stations were rather remote from centers of population and railroads transportation meant long hauls by mule or ox teams. For this reason local materials obtainable in their immediate vicinities were generally used in the construction of the forts; stone and wood in Kansas, Oklahoma and Texas; adobe and wood in Arizona and other dry areas, and principally wood at northern stations. However, the total construction accomplished during this period at both eastern and western stations, extended as it was over three decades, added little to the construction activities of the nation.

In 1898 the Spanish-American conflict swept the land. Army performance was poor, but a rather efficient Navy upheld national prestige. However, out of the unpleasantness the Army gained a notable point. It became construction conscious, and aided by far-seeing political leaders of the time, particularly Theodore Roosevelt, instituted action to strengthen national defenses.

The nation had grown up overnight as it were, and had made its debut into the currents of international intrigue. Puerto Rico, Hawaii, Guam, the Philippines and other far-flung areas had been added to the national domain; the Panama Canal was evolving into realization. In Europe there was ever and anon saber rattling. Japan had beaten Russia, and irritated by the Oriental exclusion acts of this country was eyeing the American scene with resentful gaze.

Under the circumstances Congress acceded to the demand for betterment of the National defense and appropriations were provided to begin this. Piecemeal work was continued at the Atlantic stations. Pacific Coast stations were enlarged and certain new ones established. Also a number of new stations were constructed in interior zones and defense works initiated in Panama, Hawaii and the Philippines. At the West Coast stations and in the foreign possessions the construction (buildings) was principally of the wooden type, but elsewhere it consisted mostly of permanent types, utilizing masonry, concrete and steel, with wood playing its usual minor role. For a time these construction activities were an important item in the national construction industry, but eventually appropriations dwindled and construction correspondingly lapsed.

Then came the World War and the eventual involvement of the United States. Construction requirements for the military service unfolded with amazing rapidity. Lumber, cement, steel, and other structural materials in millions of units each were required for cantonments, wharves, vessels, factories and other war accessories. The mobilization of industry was as vital to success as the mobilization of men. Programs of standardization, elimination and conservation were mapped out. Peace time methods were converted into the faster tempo of war methods regardless of economy.

Hard headed business men were bewildered by the sudden rush, but patriotically carried on. The difficulties incident to meeting special requirements forced many out of business. Nevertheless, despite the shortcomings attendant on the sudden speeding up of staid, old activities, much resulted that

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An example of Quartermaster Corps work: The reinforced concrete Army and Navy General Hospital building at Hot Springs, Ark. Designed and contract let by the Quartermaster Corps.

The O.R.C. and the R.O.A. in the Plan of National Defense

by

Colonel Stephen A. Park, Inf.-Res.

National President, Reserve Officers' Association of the U. S.

STORIES of youths who are born in poverty, struggle against adversity, and finally attain success in the field of finance, science, art or some other chosen field of activity, are always popular. They never fail to strike a responsive cord.

In the development of the Officers' Reserve Corps since its birth in June, 1920, with the passage of the National Defense Act, there is a real success story which may well be told in this Seventy-Fifth Anniversary Edition of the ARMY AND NAVY JOURNAL.

At the youthful age of 18, the O.R.C. has won the respect and admiration of its parents, brothers, sponsors and all others who have anxiously followed its progress since the day of its christening. It still needs much help, encouragement and guidance, but so far, considering its handicaps, it has "made good" in a "big way."

"What were these handicaps?" you ask.

Well, in the first place, this youngest addition to the National Defense family had a twin brother, the Enlisted Reserve Corps, who, very unfortunately, was even less desired than the Officers' Reserve Corps, and because of neglect has never amounted to much. There are many who do not even know that he exists, but his name still appears among the living in the family Bible. Thus, through all these years, the O.R.C. has missed the companionship, the experience, discipline and training which it would have had if the E.R.C. had been properly cared for. This has always been a serious handicap to the development of the O.R.C.—one with which its older brothers, the Regular Army and the National Guard never had to contend.

Then, as we study the early history of this O.R.C., we find that he was a big, ungainly child (about 66,000 strong) with his creators seemingly at a loss to understand how he would fit into the family picture, indifferent toward his capacities, and loath to spend much money on his training.

But the lusty youth was not to be downed. Like the proverbial hive of bees whose power lies in organization, he decided that if he ever expected to get anywhere he must find a means of expressing his needs and fighting for his rights. And so the Reserve Officers' Association was organized and became the mouthpiece of the O.R.C., carrying its appeals to the War Department, to the Congress, to the citizenry of the country, and occasionally to the President.

This organization was confronted with the task of overcoming misunderstanding and ignorance in some quarters and mere apathy or indifference in others. But friends rallied to its support. Discerning and far-sighted military leaders like General Pershing vigorously advocated a Reserve which would be a real, effective force, not merely a list of units and individuals on paper. The Association gradually secured the sympathetic attention and support of members of Congress, and slowly, but surely, the stock of the Officers' Reserve Corps began to rise on the National Defense market. The R.O.A. gained rapidly in dignity and prestige, and, today, is accepted, without question, by the War Department, the Congress, and the President, as the official mouthpiece for the 97,500 Reserve officers of the Nation.

One of the most serious problems which has constantly faced the Officers' Reserve Corps during its period of growth and development has been the exceptionally large turnover in its personnel. Whereas, in 1922, the Corps consisted almost exclusively of men who had seen World War service, the proportion of that group to the total has rapidly dwindled and is now less than 17% of those on the active list. Of the 97,500 Reserve Officers now active, approximately 50% are post-war graduates of the R.O.T.C., 4% are from the C.M.T.C., 3% from the Regular Army, and 26% are direct from civilian life.

While the active strength of the O.R.C. has increased from 66,208 in 1922 to the present 97,500, or an average of 1956 per year, the net increases for the past two years have been approximately 1000 annually. Even at the average rate of increase for the 16-year period, it will require 12 years for the Corps to reach the minimum of 120,000 Reserve Officers required for the first phase of a major mobilization. In the light of present world affairs such a delay is certainly inadvisable. The War Department and the Corps itself are therefore faced with the dual problem of (a) retaining a larger percentage of those officers now on the active list and (b) increasing the annual increments.

In dealing with the first phase of this problem, the losses in the O.R.C. have been staggering in their magnitude. Reference has already been made to the tremendous drop in the number and percentage of World War veterans since 1922. This was natural and was to be expected. However, in the case of R.O.T.C. graduates, constituting the bulk of replacements for the O.R.C., the losses of young officers have assumed alarming proportions. For a number of years the R.O.T.C. has been supplying on the average about 6,000 second lieutenants annually. Since 1920 there have been approximately 96,000 such graduates commissioned in the O.R.C., but only 48,000 of these are now on the active list. In recent years, the losses in this category have grown to 80% or more. For example, on June 30, 1936, there were 47,343 active and assignable Reserve officers who had come from the R.O.T.C.; on June 30, 1937, there were only 48,373, in spite of the fact that 5,622 newly commissioned graduates had been added to the Corps during the fiscal year, then closing.

Endeavoring to cope with this situation, the War Department took the following steps (quoting from address by Brig. Gen. Edwin S. Hartshorn, Executive for Reserve Affairs, at this year's National Convention of the Reserve Officers' Association):

"Arranged for training camps for newly appointed R.O.T.C. graduates in June, immediately following the close of college.

"Cancelled requirement of the physical examination as a condition for the first reappointment only.

"Cancelled the requirement of qualifying for a certificate of capacity as a condition for promotion to the grade of first lieutenant in the case of graduates of senior R.O.T.C. units.

"Embarked upon a program designed to provide a reasonable annual increase in the financing of fourteen-day training."

General Hartshorn then comments:

"It will be impossible to definitely evaluate the effect of these changes until the returns of the present fiscal year (ending June 30 1938) have been received."

In my opinion, the first and fourth of these measures are most progressive, and should prove very salutary in their effect. The second and third, however, seem to me artificial and essentially unsound. In the first place, the same general conditions and requirements for appointment, reappointment and promotion should apply to all officers regardless of grade, and in the second place, such concessions simply serve to encourage the young officer to remain inactive for a period of five years or more and lead him to believe that he can drift along and even secure promotion with little or no effort on his part. Such inducements are not conducive to developing the Officers' Reserve Corps into a strong, reliable and efficient component of the Army.

Having studied this particular situation for many years and being convinced that the cause for the great losses of young officers in the O.R.C. is for the most part economic, the R.O.A., at this year's convention, went on record as advocating the securing of appropriate legislation which will provide reason-

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The Importance of the Naval Reserve

A Substantial Reserve of Trained Man Power Stressed as an Important Need for Our Naval Defense

by

Commander Albert Soiland, M.C.V.(S) U.S.N.R.-Ret.

President, United States Naval Reserve Officers Association

IT has been interesting to observe the moulding together of a selected yet heterogeneous group of men gathered from every walk of life and from every community niche and corner of the United States to form a naval reserve organization. This movement has received added impetus during the past few years, and at the various drill meetings one can sense the spirit which motivates these young men into a determined action to learn the ropes and go to sea. The neophyte however soon learns that there are many pitfalls and obstacles to overcome before recognition is gained or promotion secured, also that the road is long and arduous. True many members of the special reserve groups or classes are fully qualified by their daily professional contacts, trades or vocations to step into active duty immediately upon the outbreak of war or national emergency. Unfortunately however these have almost without exception no knowledge of navy regulations or naval routine. Officers of the regular navy have frequently commented upon the many instances when reserve officers visiting naval ships or stations in uniform, appear improperly attired and nearly always ignorant of proper salutes, deportment and ordinary naval regulations. That this is a fact, your humble scribe can readily testify to, having himself been guilty on altogether too many occasions in the past, because of lack of facilities for proper instructions.

Nevertheless, it is heartening to note the enthusiasm with which the vast majority of reservists who come from inland localities without any previous knowledge of the sea or ships adapt themselves to their new environments in naval routine. Naturally men in the various drilling units who receive a modicum of drill pay for their efforts, soon acquire a working knowledge of their obligation to the Navy and the Nation. Such units in a reasonably short period of time after enrolment become proficient for duty, afloat or ashore. This desirable status unfortunately is not so easily acquired by the various volunteer and special service classes, provision for training of which has not as yet been satisfactorily worked out by the Navy Department. It would seem highly desirable for the Navy Department to prepare and furnish to each naval reservist upon enrolment and particularly directed to the volunteer classes, a naval primer not too technical, but covering the essentials of what a naval reservist, officer or man, primarily should know and must learn. Once this is acquired, the naval reserve in peace time becomes an effective civilian arm of the service with a direct public contact and influence which is desirable and which the Navy per se cannot otherwise attain. When the eventual M. day arrives, the naval reserve takes on a vastly more important aspect, and if we are to profit by our world war experience, a highly necessary and welcome addition to the regular Navy personnel. The significance of this statement is apparent when we recall that if mobilization occurs in the immediate future, it will require the combined man power of the Navy with all its reserve branches to adequately man and operate our Nation's entire Navy equipment, ships, stations and stores afloat or ashore. The United States Naval Reserve appeals to all young, red blooded United States citizens to join the various reserve forces in any branch, class or arm they may choose. In no former period of our nation's history has the United States of America been more sorely in need of a sustained nationalization movement than at present, and incomprehensible as it appears the danger seems to lie within our own borders rather than without. In passing we must pay high tribute to those three splendid arms of the Navy, the Marine Corps Reserve, the Merchant Marine Reserve and that indispensable and perhaps not sufficiently appreciated branch, the United States Coast Guard, and more power to them.

Through the courtesy of Captain L. W. Hesselman, U.S.N.R. our past president, I am privileged to append at the conclusion of this article a recent tabulation of the naval reserve strength in its various ramifications.

Recalling that during the World War the Navy was expanded from an initial strength of about 4,000 officers and 55,000 enlisted men to a maximum strength of about 30,000 officers and 450,000 enlisted men; and that the Marine Corps was expanded from about 350 officers and 10,000 enlisted men to about 1,500 officers and 50,000 enlisted men, it is obvious that a substantial reserve of man power is an important need for our Naval defense.

	OFFICERS	ENL. MEN	TOTAL
FLEET CLASS, including Naval Militia (corresponds approximately to the Nat'l Guard)	1,169	10,071	11,240
VOLUNTEER CLASS, (Corresponds approximately to the Army Reserve)			
(a) General Service Personnel	2,455	7,677	10,132
(b) Specialists (includes seagoing, aviation, communication, medical, construction, ordnance, intelligence, civil engineering, and other branches)	4,764	4,387	9,151
MERCHANT MARINE CLASS, (personnel engaged in the seagoing profession in civilian status)	3,527	29	3,556
TRANSFERRED CLASS, (men who have served in the regular Navy, some for 16 years and others for 20 years)	.....	15,379	15,379
TOTAL NAVAL PERSONNEL RESERVE	11,915	37,543	49,458

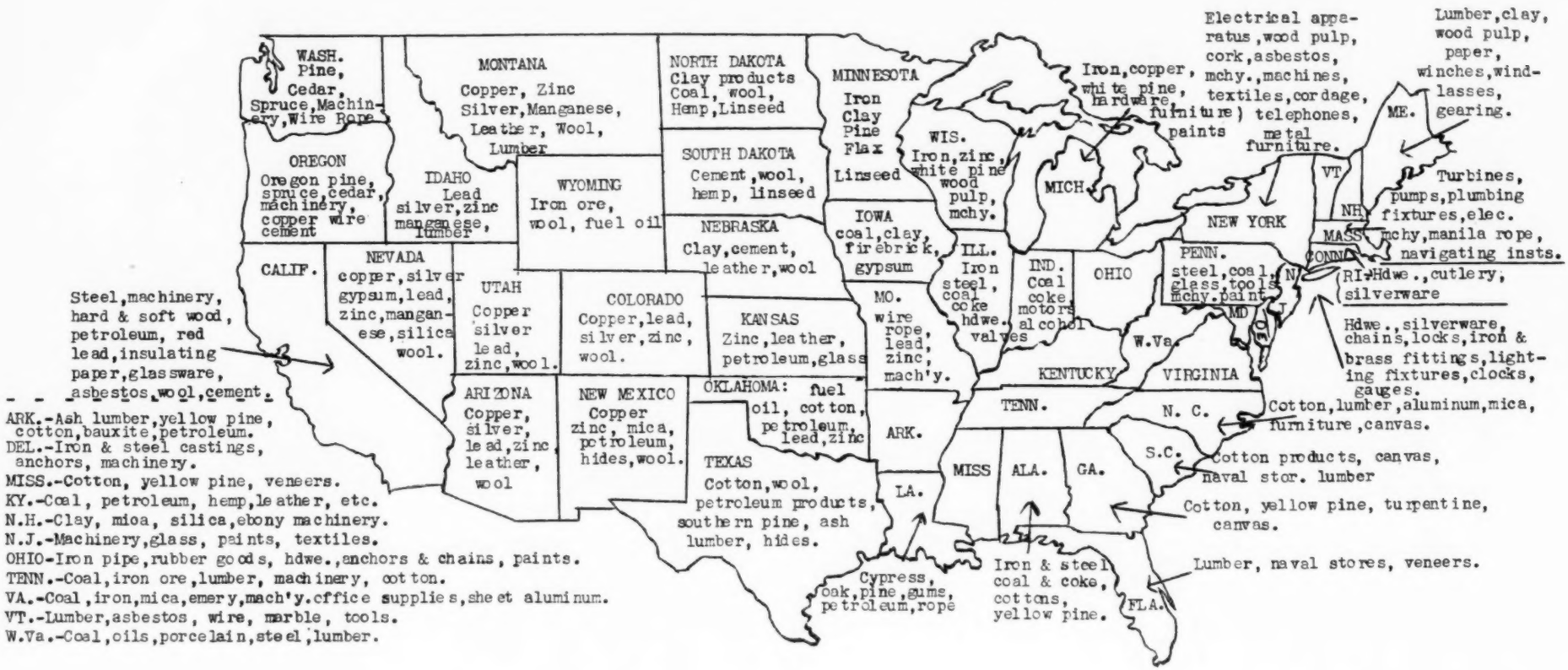
Marine Corps Reserve strength may be stated as:

	OFFICERS	ENL. MEN	TOTAL
FLEET CLASS, including Naval Militia (corresponds approximately to the Nat'l Guard)	307	4,828	5,135
VOLUNTEER CLASS, (corresponds approximately to the Army Reserve)	546	6,835	7,381
TRANSFERRED CLASS, (Men who served in the regular Marine Corps, some for 16 years and others for 20 years)	.....	668	668
TOTAL MARINE PERSONNEL RESERVE	853	12,331	13,184

This reserve man power is intended to reinforce the Navy and the Marine Corps immediately on the outbreak of hostilities. The present strength of the Regular establishment may be stated as:

	OFFICERS	ENL. MEN	TOTAL
NAVY, Regulars	9,840	105,000	114,840
MARINE CORPS, Regulars	1,196	16,414	17,610
TOTALS	11,036	121,414	132,450

Benefits from U. S. Naval Shipbuilding go into Every State


WASH. Pine, Cedar, Spruce, Machinery, Wire Rope
MONTANA Copper, Zinc Silver, Manganese, Leather, Wool, Lumber
NORTH DAKOTA Clay products Coal, wool, Hemp, Linseed
MINNESOTA Iron Clay Pine Flax Linseed
OREGON Oregon pine, spruce, cedar, machinery, copper wire cement
IDAHO Lead silver, zinc manganese, lumber
WYOMING Iron ore, wool, fuel oil
SOUTH DAKOTA Cement, wool, hemp, linseed
NEBRASKA Clay, cement, leather, wool
IOWA coal, clay, firebrick, gypsum
WIS. Iron, zinc, white pine wood pulp, mchy.
Iron, copper, white pine, hardware, furniture, paints
Electrical apparatus, wood pulp, cork, asbestos, mchy., machines, textiles, cordage, telephones, metal furniture.
Lumber, clay, wood pulp, paper, winches, windlasses, gearing.
MICH.
NEW YORK
ME.
VT
NH
Turbines, pumps, plumbing fixtures, elec. mchy, manila rope, navigating insts.
MASS.
CONN.
RI
Hdwe., cutlery, silverware
CALIF.
NEVADA copper, silver gypsum, lead, zinc, manganese, silica wool.
UTAH Copper silver lead, zinc, wool.
COLORADO Copper, lead, silver, zinc, wool.
KANSAS Zinc, leather, petroleum, glass
MO. wire rope, lead, zinc, mach'y.
ILL. Iron steel, coal coke hdwe. valves
IND. Coal coke motors alcohol
OHIO
PENN. steel, coal, glass, tools mchy. paint
N.J.
MD.
W.Va.
Hdwe., silverware, chains, locks, iron & brass fittings, lighting fixtures, clocks, gauges.
Steel, machinery, hard & soft wood, petroleum, red lead, insulating paper, glassware, asbestos, wool, cement.
ARIZONA Copper, silver, lead, zinc leather, wool
NEW MEXICO Copper zinc, mica, petroleum, hides, wool.
OKLAHOMA: fuel oil, cotton, petroleum, lead, zinc
KENTUCKY
VIRGINIA
TENN.
N. C.
Cotton, lumber, aluminum, mica, furniture, canvas.
ARK.
TEXAS Cotton, wool, petroleum products, southern pine, ash lumber, hides.
S.C.
Cotton products, canvas, naval stor. lumber
MISS
ALA.
GA.
LA.
Cotton, yellow pine, turpentine, canvas.
Lumber, naval stores, veneers.
Cypress, oak, pine, gums, petroleum, rope
Iron & steel coal & coke, cottons, yellow pine.
FLA.
ARK.-Ash lumber, yellow pine, cotton, bauxite, petroleum.
DEL.-Iron & steel castings, anchors, machinery.
MISS.-Cotton, yellow pine, veneers.
KY.-Coal, petroleum, hemp, leather, etc.
N.H.-Clay, mica, silica, ebony machinery.
N.J.-Machinery, glass, paints, textiles.
OHIO-Iron pipe, rubber goods, hdwe., anchors & chains, paints.
TENN.-Coal, iron ore, lumber, machinery, cotton.
VA.-Coal, iron, mica, emery, mach'y. office supplies, sheet aluminum.
VT.-Lumber, asbestos, wire, marble, tools.
W.Va.-Coal, oils, porcelain, steel, lumber.

THE carrying out of the Navy's Shipbuilding Program has a very substantial effect on business and industry, not only in the areas in which actual ship construction is carried on but in every State in the Union.

In the fiscal year 1939 Congress provided for starting the construction of four battleships, four cruisers, eight destroyers, six submarines and 13 auxiliaries. A total of $164,613,150 is being spent on them during the year, the effect of which is felt in practically every industry and community.

The estimates in the following table are round figures covering work not only in the ship building trades, but in a great variety of other trades and occupations. This is because the shipbuilder, whether a Navy Yard or a private shipyard, does not manufacture all of his material from its primal elements. The steel is purchased from steel mills, the boilers are frequently purchased, the electric motors are obtained from electric manufacturing concerns and so on. Such sub-contractors in turn purchase their material such as lumber, wire, pig iron, textiles and the like from other makers. Thus the money to build a ship eventually passes down through many hands until it reaches the men who tap the ultimate source of the raw materials—namely Mother Earth. The earth provides the metals, minerals and vegetable products which by innumerable processes are eventually translated into the parts of the ship and are incorporated in it to make a naval vessel.

For the shipbuilding at the site, (and the site in this sense includes not only the place where the hull is built, but also the place or places where the armor, armament and ammunition are manufactured), the money spent may be divided roughly into two equal portions, one representing the amount paid out in wages and the other representing the amount paid out for material. As explained in the preceding paragraph the amount thus spent for material is eventually translated into labor and other material at the works of the sub-contractors. A large naval vessel building at the New York Navy Yard, for example, benefits also many factories and industries throughout the country.

The following table shows the approximate distribution of estimated costs of ships (the total costs including construction, hull, machinery, armor, armament and ammunition):

Vessel	Approximate Estimates	Labor at Site	Labor away from site	Cost of raw materials
Battleship	$70,850,300	$35,000,000	$25,223,300	$10,627,000
Cruiser	22,300,000	11,000,000	7,950,000	3,350,000
Aircraft carrier ..	31,600,000	15,800,000	11,130,000	4,670,000
Destroyer	8,000,000	4,000,000	3,200,000	1,300,000
Submarine	6,500,000	3,000,000	2,500,000	1,000,000
Submarine tender .	12,600,000	6,500,000	5,200,000	1,900,000
Seaplane tender ..	13,000,000	6,500,000	4,550,000	1,950,000
Destroyer tender..	13,000,000	6,500,000	4,550,000	1,950,000
Oiler	6,000,000	3,000,000	2,100,000	900,000
Minesweeper	2,500,000	1,250,000	875,000	375,000
Fleet Tug	2,000,000	1,000,000	700,000	300,000

Surface Vessels of the United States Navy

VARIED types of vessels make up the mighty sea armadas of the present day. While in times past, war galley fought war galley and towering frigates stood broadside and poured cannon-shot into each other with the issue often settled by the cutlasses of boarding parties, modern naval warfare involves a clash of great Fleets—in which are combinations of vessels each having its special task.

The advent of the submarine and the airplane has made it impossible for the largest ship with the heaviest guns to sweep everything before it, unaided, as in the past. While the big ship with the strongest punch and heaviest protection is still considered the backbone of sea power, it must be supported in battle by a host of other craft. It must have scouts to seek out the enemy and warn it of its position; a screen of smaller vessels to guard it against sudden enemy raids; and supply ships to keep its fuel, provisions and ammunition. These needs have developed the various specialized types of the Fleet of today.

Foremost among the various types is the battleship. Guarding it and servicing it are cruisers, destroyers, aircraft, supply ships, repair ships, tankers, mine-sweepers, hospital ships, store ships, tenders, transports, tugs. The role of the battleship in modern warfare has been well described by Rear Adm. W. R. Sexton, USN. Writing in the ARMY AND NAVY JOURNAL of May 26, 1934, Admiral Sexton, then Commander, Battleships, United States Fleet, said:

Battleships

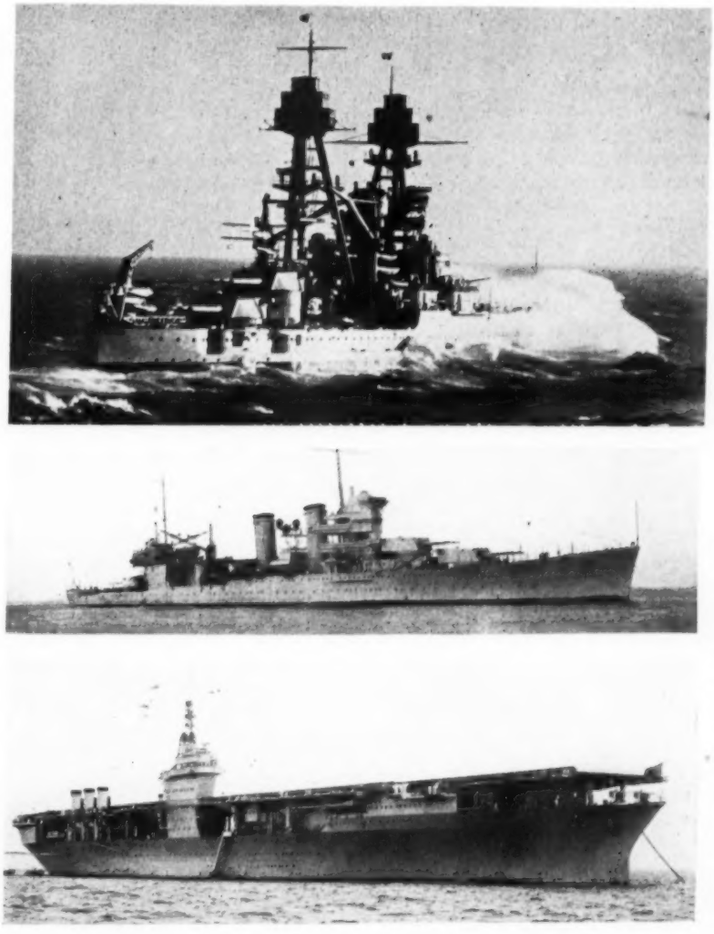
"The function of battleships has not changed since the days when Nelson's ships of the line rode out the winter gales before Toulon. Those high-walled vessels marked an end and a beginning, and the basic principles that produced them are as true today as at Trafalgar, and must inevitably remain, despite changes in design, in gun power, in protection and in sea-keeping qualities.

"As Mahan points out, the offensive, in naval war, is the function of the deep-water navy. Seaworthiness and reasonable speed are qualities necessary to every constituent of the fleet, but the real power and force of a navy are those vessels which, by proper proportion of offensive and defensive characteristics, are capable of taking and giving hard knocks. 'All others are but subservient to these, and exist only for them.'

"To punish, and at the same time be able to withstand the blows of the enemy, always has been the role of the capital ship. That this truth has withstood the assaults of the disciples of new inventions is a tribute to the common sense of the naval leaders of the past, for every advancement in naval weapons has been accompanied by the prophecy of the decadence and downfall of the capital ship. This fallacy is well exemplified in our own naval history by Jefferson's gun boats, designed to keep the enemy from our door with the minimum of expense. Nearly two hundred were built, though it was well known that their guns had to be unshipped and struck below before the vessel could safely put to sea.

"While the functions of the capital ship have not varied, its problems have been countlessly multiplied, for its preeminence has not been maintained without concession to new weapons. Indeed the most outstanding effect of naval inventions has been the revolutionary manner in which they have restricted the employment of large vessels. The ship-of-the-line could sail the seas without fear of interference save from vessels of greater metal, but with the advent of the American Civil War the first great change took place, for not only did the introduction of ironclads foreshadow the downfall of wooden ships, but the submarine and torpedo were introduced with startling results. In Charleston harbor a Federal ironclad was torpedoed, and at Mobile Confederate mines and torpedoes accounted for the sinking of two monitors and a score of smaller vessels within a space of ten months.

"Thus the ironclad had no sooner appeared than still newer naval weapons forced it to assume the defensive. For the first time, capital ships required protection. During the past century this need has grown, until now we provide our heavy ships with three forms of defense; strengthened hull design and antiaircraft defense within the ship, a cordon of light forces thrown around the battle line, and, finally, the tactical security afforded by the position of battleships in fleet formations. All of these steps are taken to protect the capital ship until it arrives at the point where it may fulfill its mission, and, despite new problems, this mission is unchanged. For so long as it retains the ability to give and take hard knocks, the battleship will remain the bulwark of a strong navy."



Vessels of the Fleet. Upper, battleship (USS Pennsylvania); center, Cruiser (USS Tuscaloosa); and lower, Aircraft Carrier (USS Ranger).

Cruisers

The same issue of the ARMY AND NAVY JOURNAL contained descriptions of the functions of other types. Rear Adm. Harris Laning, USN-Ret., then Commander, Cruisers, United States Fleet, wrote on Cruisers. He stated:

"To grasp the meaning of the term 'cruiser,' one must appreciate the difference between that type and the battleship type. Battleships are the backbone of any Navy. They have the heaviest armor and armament their allowed displacement can stand. The paramount considerations in their design are hitting power and invulnerability to enemy attacks of all kinds. As nearly as they can be, battleships are made unsinkable, and should be able to continue fighting no matter what the damage or how many attacks are made on them. In order to provide both offensive and defensive strength it is necessary in design to make sacrifices in speed and maneuvering ability but as a result of its design, the battleship approaches being a mobile part of the United States that can be projected to a theatre of war.

"As differing from the battle-

(*Continued on page* 125)

The Army's Finances

by

Major General Fred. W. Boschen

Chief of Finance, U. S. Army, and Budget Officer for the War Department

CONSIDERATION of the Army's finances involves more than a summation of the receipt and expenditure of funds, since the strength and operations of the military forces and their instrumentalities are reflected generally in the amounts of expenditures necessary to meet the desired objectives.

In 1863, the Civil War had necessitated an increase in the Army from a peace-time strength of less than 17,000 officers and enlisted men to over 900,000. In that year, there was spent for military purposes over 600 million dollars as compared with the previous peace-time expenditure average of about 15 million. The peak of yearly disbursements during the Civil War period was reached in 1865, when over one billion dollars was paid out. However, the average for each of the thirty-three years of peace which followed was only about 25 million dollars, while the average yearly strength for the same period was about 27,000 officers and enlisted men.

At the height of the Spanish-American War, the total personnel of the Army reached 263,000, and expenditures in the fiscal year 1899 increased to about 230 millions of dollars. The percentage of decrease after this war, while large, was not so pronounced as that following the Civil War, since the strength was not allowed to go below 66,000, being increased to 102,000 by 1916.

During the World War, although the tremendously increased strength of the Army accounted for a large portion of the increased expenditures, approximating $9,208,000,000 in the peak year of 1919, other cost-affecting factors which are present at all times, were accentuated. New methods of warfare which were developed within the few years of war prior to the entry of the United States called for equipment not previously used by this country, or used only to a small extent, and the cost of equipping and maintaining the Army up to the standard required was made larger because of the high level of commodity prices.

At the present time, the strength of the Regular Army authorized by the Army Appropriation Act is 12,575 commissioned officers and 165,000 enlisted men. The amount appropriated for military purposes is in line with other years when it is considered that warfare now is highly technical, causing the percentage of expenditures for equipment to be larger than ever before and augmenting the outlay for personnel capable of using to advantage the complicated instruments and machines. The annual appropriation Act in support of the Military Establishment for the fiscal year 1939 carried a total of $459,401,254.

Of additional interest in connection with Army finances is an insight into some of the history of the organization charged with handling the funds and the disbursing methods used, which it may be seen, have undergone material changes since 1863. Prior to the World War each bureau of the War Department separately disbursed the funds which Congress appropriated for it. The Pay Department of the Army disbursed only pay and travel funds, accomplishing this in 1863 with a wartime force of 357 paymasters which was considerably in excess of the total of 60 paymasters on duty a few years previous. Payments to troops at that time necessitated much traveling on the part of the paymasters between the depositories and the stations of the troops. Payments were not regularly made, and it was not until 1887 that the value of monthly payments was recognized to a sufficient degree to merit consideration. It was many years later, in 1896, when the system of paying monthly was extended to reach all components of the Army wherever located.

The World War necessitated a tremendous increase in military expenditures. Moreover, the conditions brought about by the war emphasized the faults of the then existing system. Accounting difficulties, duplications in estimates, and other obstacles in the way of efficient management within the War Department were paralleled by much trouble experienced by manufacturers of war equipment and supplies in meeting the varied requirements of the different bureaus before obtaining the payments due them. Considerable confusion was the result, and the Army's finances after one and one-half years of participation in the war had reached such a state as to demand an immediate change in methods. This change was effected on October 11, 1918, with the grouping of all disbursing activities under a Director of Finance, and finally by the permanent establishment of the Finance Department by the Act of June 4, 1920, which now consists of 129 officers, 38 warrant officers and 456 enlisted men.

Effective control over finances had by this time become a reality and the task immediately at hand was to further improve the gains thus far made. The Army Finance School was then established to train commissioned officers and enlisted men to more competently carry on the work delegated to them, and the results that followed quickly reflected not only the value of the efficient administrative policies pursued, but also the efficacy of the change to the new methods of disbursing.

In recent years, the passing of time has served only to enhance the value of the service rendered by the Finance Department. In it, the Army now has an organization which is helping to secure the largest return for every dollar spent, and is capable and ready at all times to meet any requirement which may be placed upon it.

Functional Breakdown of War Department Appropriations, FY 1939

Total War Department Appropriations—Civil, Military and Departmental		$719,484,989*
For strictly civil affairs	$220,987,867*	
Rivers and harbors; flood control; Panama Canal operation and maintenance; National Cemeteries, etc.		
Departmental	5,600,387	
For pay of civilian employees in Washington; Contingent Expenses; Printing and Binding; Library SGO; Army Medical Museum.		226,588,254
TOTAL MILITARY APPROPRIATION		$492,896,735*
Of the above amount, the principal items of expense are:		
Pay, Military Personnel	$196,703,119	
This includes personnel in the Army, cadets at West Point, Army Transport Service and other facilities operated by the Army; pay for one drill per week for National Guard.		
Pay of civilian personnel in the field	18,050,835	
Cost of clothing for Army Enlisted Men and the National Guard	13,441,128	
Cost of Subsistence for Army Enlisted Men and the National Guard	34,562,697	
Maintenance & operation of plant & Equipment:—		
General	63,784,878	
Replacement of equipment	6,588,040	
Cost of training—direct charges	20,172,945	
Miscellaneous (largely research and development	7,092,642	
New equipment	102,362,677	
New construction	12,108,380	
Contract authorizations	18,029,394	$492,896,735*
Of the $492,896,735* appropriations for the Civilian Components are:—		
National Guard	$43,324,733	
Organized Reserves	12,235,783	
R O T C	4,825,842	
C M T C	2,275,000	

*Includes contract authorizations and reappropriated funds.

Steel and the U. S. Navy

by

Capt. Henry Williams, C. C., U. S. N.

THE first metal shipbuilding material was wrought iron, the first Naval ship of this material being the former Michigan, now the Wolverine, built in 1844 at Erie, Pa. It is said that many people, believing a metal ship could not float, travelled great distances to its launching at Erie with the expectation of seeing it sink. The Reina Mercedes, well known to Naval Academy graduates, is an iron ship. She was built in Cartagena, Spain, in 1887.

The use of steel in building ships is a comparatively recent development. There are men living today who were present when the keel was laid of the first steel ship built in the United States, and that ship was a naval vessel, the U.S.S. Dolphin. The use of steel as structural material for other than ships goes back a little farther, but not by many years. Steel plates were first used in the United States in 1861 for making an experimental fire-box for a locomotive at the Altoona shops of the Pennsylvania Railroad. It was not until 1865 that a second fire-box was made of such material. The difficulties in making plates of steel were very great at that time. For centuries crucible steel had been used for making cutlery, swords and other small objects, but until the problem had been solved of producing fluid steel in large masses, and rolling or forging the large masses after they had solidified, no progress could be made in producing, in quantity, rails, plates, shapes, forgings, etc.

It was really the demand for something stronger than wrought iron for making rails that led in 1856 to the invention in England of the Bessemer converter. It took some years to perfect this invention to the point where it was commercially successful. In 1869 steel was used in the construction of the St. Louis bridge across the Mississippi River. Its use at that time was considered a bold piece of engineering, and the experiment was not repeated until about 1879, when Bessemer shapes and plants were adopted for the roadway, girders, and approaches of the Brooklyn Bridge.

In 1881 Secretary of the Navy, William H. Hunt, appointed a board for the purpose of recommending the construction of new vessels for the Navy. This board marks the beginning not only of the modern American Navy, but also of the manufacture of steel as an industry in the United States. The board, after very lengthy deliberation and study, recommended the abandonment of wrought iron in building the new ships and the use of steel instead. The board was not unanimous in this recommendation, as the more conservative members felt that the art of making steel in the United States, or elsewhere, for that matter, has not been developed sufficiently to justify so bold a step. However, the views of the majority of the board prevailed, and four vessels of steel of *domestic* manufacture were authorized by Congress. The requirement that the steel be of domestic manufacture had far-reaching consequences. The vessels in question were the Dolphin, Chicago, Atlanta, and Boston—the "A B C D Ships," as they were known. The contract was placed with John Roach, of Chester, Pennsylvania, on July 26, 1883.

The influence of this building program on the steel industry of the country was very great, not because of the tonnage involved but because of the specifications as to quality which were prescribed, and because the authorizing act stipulated steel of domestic manufacture. At first no one was willing to accept a contract to produce steel in accordance with the specifications of the Navy Department. Finally, John Roach himself built a mill for making certain of the material. Other mills were then persuaded to take on some of the work, but the difficulties which all of them experienced in producing steel complying with the specifications were enormous. Great pressure was brought to bear on the Navy Department to modify the requirements of the specifications, but all such pressure was successfully resisted. Finally, material was produced which met the specifications, and what was of greater importance, it taught manufacturers how to make good steel, and settled definitely the question of the superiority of steel over wrought iron for ship construction.

While on this subject, it is of interest to note what happened to John Roach. He suffered the fate that has been the lot of so many pioneers in one field or another. He was the only shipbuilder who would take a chance on building the ships of steel. He did so because he believed in progress. After he had been awarded the contract, he could find no mill that would agree to make the steel to the specifications of the Navy Department; so with his own means he built a mill, although he did not want to go into the steel-making business. He pointed the way for others in making good steel, and he built the ships. However, before the ships were delivered, another political party came into power, which needed ammunition for discrediting the former administration. Scandal and corruption in the award of the contracts and in the building of the ships were charged. This resulted in his financial ruin. What grieved him most was that he should be charged with corruption for doing the country what he conceived to be and what proved to be a great public service. John Roach died a few years later a broken and embittered man. However, the steel industry had been put on its feet, and the ships remained in service for almost forty years. The Dolphin was scrapped in 1923.

What was the naval architect looking for when he turned from wrought iron to steel as a shipbuilding material? He was looking primarily for more strength on less weight, and that quest will never cease so long as ships are built. There were other reasons for abandoning wrought iron — the need for greater uniformity and reliability, as wrought iron is not a homogeneous material; the need for plates and shapes of greater size, as it is difficult to make wrought iron in large masses; less cost, as wrought iron is an expensive material compared to steel because of the great amount of manual labor involved in its manufacture.

The grade of steel which is used to a greater extent than any other in shipbuilding is designated as medium steel by the Navy Department, or mild steel, according to some other classifications. It is required to have a tensile strength of not less than 60,000 pounds per square inch, with an elongation of not less than 25% in an 8-inch test specimen. Steel can be given physical properties of great range and variety; tensile strength from 45,000 pounds per square inch to almost 300,000 pounds per square inch; hardness from the dead-soft flanging steel to armor plate, which resists all cutting tools; ductility of great range; shock and wear resisting qualities; etc. The great variety of physical properties which can be given steel are obtained, first, by mechanical working; second, by varying the carbon content; third, by the addition of alloying elements in varying amounts; fourth, by heat treatment; and, finally, by a combination of any or all of these means. There are a dozen elements which, if added to steel in varying amounts and in various combinations, influence its physical properties to a marked degree. The metallurgy and manufacture of steel in all of its ramifications has become one of the most elaborate applied sciences practiced by men.

In contrast with commercial vessels, steel in ships of the navy is not only required to have great structural strength, but in the offensive and defensive parts of the vessel it is required to have other properties. Steel for guns must be capable of resisting great stresses in order to develop the power necessary to hurl great projectile weights. Steel for armor must be hard and tough in order to resist the impact of those projectiles. The competition between ordnance and armor is ever great.

Alloy steels for guns and armor plate must be carefully made and very carefully heat treated in order to produce the physical properties required. These steels represent great advances from the days of the first iron ships when cannons were of brass and cannon balls were cast iron, when the armor was

(*Continued on page* 96)

Progress and Development of American Cavalry During the Past 75 Years

ON the occasion of the publication of the Diamond Jubilee Edition of the ARMY AND NAVY JOURNAL, it would appear to be particularly fitting that a consideration of the progress of the cavalry of the United States during this period should start with General Hooker's organization of the first American Cavalry Corps for the battle of Chancellorsville in 1863, just seventy-five years ago.

It was from the crucible of that war seventy-five years ago that American cavalry emerged with a new concept of the principles of organization, armament and doctrine. Almost half a century was to pass before foreign cavalry was to adopt the Civil War doctrine of American cavalry. Since then, the principle of utilizing cavalry for the quick movement of striking power over short or extended distances, which was the motivating influence of American cavalry at its inception, has been universally adopted wherever cavalry has been successful in the performance of its mission.

200 Battle Streamers

During the seventy-five years since the battle of Chancellorsville, American cavalry has participated in innumerable actions and engagements for which it has been awarded by the United States Government more than two hundred battle streamers for conspicuous service on the field of battle. In all of these engagements, our cavalry has always been imbued with its primary mission of combat, and such is the case today. The vital role of American cavalry today in the army combat team demands that it be organized and trained for fighting. To accomplish this combat mission, its equipment and versatility have been developed so that it can deliver its fire power with the maximum speed over any type of terrain.

Cavalry—horse and motor. Upper—Color bearers, color guard, and Chief trumpeter of the Third Cavalry, Ft. Myer, Va., ceremonially garbed in the blue uniform of their predecessors, the Regiment of Mounted Riflemen. Lower—Personnel carrier of the Seventh Cavalry Brigade (Mechanized) Ft. Knox, Ky.

In every way possible our cavalry of today is a modernized cavalry; modern in the equipment with which it is to perform the normal cavalry role, and utilizing to the fullest extent the latest developments in the realms of radio, automatic weapons, and automotive science. In each regiment of horse cavalry of the Regular Army today there is a scout car platoon which considerably extends the horizon of the commander. These scout car platoons are also being provided National Guard cavalry regiments, and already the first increment of these vehicles has been delivered.

Considering the most probable theatre of employment of our army there is presented the requirement for extensive movement. While this characteristic of movement has always been inherently American and is typified in the motivating spirit of the American cavalry today, as a matter of fact there is every indication that all armies of the world are at the very moment engaged in seeking ways to avoid stabilization. In order to facilitate this movement in warfare, our cavalry is denuded of all excess appendages and transport. The trains are completely motorized. It is not provided with every conceivable type of weapon for which there is a probability of use on certain special occasions. Instead, the equipment of this light and mobile element very wisely has been limited to that which the cavalry trooper can carry into battle and use advantageously on normal combat missions. This restriction to basic requirements in equipment has resulted in the retention of that mobility which has been found to be so valuable to American cavalry throughout history.

As the fastest and surest means of transporting in the forward area the individual soldier with his equipment, which, in the final analysis is the basic fighting unit, the horse continues in the forefront today.

New Cavalry Division

Currently there is being tested a new type of cavalry division. During the recent maneuvers in Texas, certain new regimental and divisional organizations were tried out as a basis of recommendations for a proposed table of organization for the cavalry division and component units thereof. While it is too early to state the far reaching benefits of this test, it appears that, as a result of it, a new cavalry division with greater speed and striking power as the dominant characteristics may be indicated.

The machanized cavalry brigade has now received its full vehicular equipment, with a few minor exceptions. Its recent march through southern Kentucky, Tennessee into Georgia and return, which constituted the first real test of the entire brigade with its modern equipment, was beneficial from every point of view, and indicated that the new equipment, in general, is satisfactory. The problem of control by radio, by motorcycle, and from airplane was particularly interesting.

The advantageous position of this country in the automotive world would appear to indicate that we should fully utilize these available mechanical aids to combat. Finally, the United States with its ample resources of horse flesh, and utilizing its great automotive industry, is in a most advantageous position should an emergency arise to put its cavalry in the field organized and equipped to fill its place in the modern combat team.

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Motorization of the Army

by

Brigadier General R. H. Jordan

Assistant to the Quartermaster General

THE Quartermaster Corps is charged by statute with the transportation of the Army and with furnishing to the Army means of transportation by animal or other means.

For many years the horse and mule reigned supreme as the motive power for military transport. This means of transportation reached the peak of its utility during the period of our Civil War, and its utility has since declined due, to a large extent, to the rapid development of motor vehicles and highways. In the slightly over twenty-five years during which motor vehicles have been used in the military service, the improvement in availability, performance and reliability has been remarkable. The types of modern motor vehicles now in military use are immensely superior to those with which we emerged from the World War—the World War "Class B" was a vast improvement over the types first used in 1912.

The punitive expedition into Mexico in 1916 furnished the initial opportunity for the organized quantitive employment of motor vehicles by an American Army in the field.

Upon the entrance of the United States into the World War a great many commercial types of trucks then in production were selected to fulfill immediate needs and by expansion of plant facilities production was increased to meet military requirements. At the same time, the automotive industry was requested to design, in conjunction with military authorities, a standard motor truck suitable for military use. In May, 1917, automotive engineers representing the entire industry were assembled and in approximately ninety days, had designed and built for exhibit to the President of the United States, the Secretary of War, The Quartermaster General and others, a 3-ton, 4-wheel, 2-rear-wheel drive truck now commonly known as the "Class B." In addition to the Class B (3-ton), they designed the "Class A" (1½-ton), and the "Class AA" (¾-ton) models, all standardized military trucks. Due, however, to the pressing demand for vehicles and lack of time, the last two types were not put into production.

During the period 1919 to 1930, few motor vehicles were procured for the Army and the types of vehicles procured during the World War were used. Nevertheless, the Army continued to experiment with various types of motor vehicles as produced by industry to determine those most suitable for military use. As a result of considerable experimentation and testing, there were developed through the cooperation of industry the light and heavy, 4-wheel, 4-wheel drive (4x4) types. Concurrently with this 4x4 development, extensive work was conducted on heavy duty types having 6-wheel, all-wheel drive (6x6), and 6-wheel, 4-rear-wheel drive (6x4). The multi-wheel drive type of motor vehicle proved beyond a doubt its superiority in cross-country performance, but due to a lack of commercial demand for such increased performance at a considerable increase in cost, this type of vehicle has not been produced to any great extent.

By 1933, the World War types of motor vehicles built in 1918-1919 were rapidly reaching the stage where their maintenance was no longer economical and complete remotorization of old units and considerable motorization of other units were essential from a national defense viewpoint.

Since 1933 the Quartermaster Corps has purchased for military use approximately 3,500 motor vehicles from Regular Army Appropriations at a cost of over $3,520,000 and 8,800 vehicles from P. W. A. funds at a cost of nearly $8,100,000. At the present time, the Regular Army has approximately 13,500 trucks, passenger cars and motorcycles, which number is about 6,300 short of the 19,874 required to equip our present Army and its establishments. (Tractors, bicycles, trailers and tanks are not included in the above).

The National Guard, insofar as motor vehicles is concerned, was in 1933, in much the same position as the Regular Army. On December 31, 1933, they had 5,136 vehicles, all of the World War types. Since 1933, the Quartermaster Corps has procured approximately 8,000 modern motor vehicles for National Guard organizations from funds made available by the National Guard Bureau. At the present time, the Bureau has on hand approximately only one-half of the 17,266 motor vehicles required to equip the National Guard organizations.

The present policy of the War Department regarding types of motor vehicles to be procured is contained in the following directive:

> "The procurement of motor vehicles to be limited to models in commercial production by two or more competing companies and available at reasonable prices. To require the minimum deviation from standard commercial models as may be necessary to conform to the military characteristics set up by the using arm or service * * *. The parts or unit assemblies so used to be standard in the automotive industry."

This indicates that in the event of future emergencies the motor vehicles to be used will be those commercial types best suited to military use, or commercial types modified to meet military requirements. It has been estimated that in an emergency the Army will require 10% of all the ½ to ¾-ton trucks produced; 77% of all the 1 to 1½-ton trucks and 240% more trucks of the 2½-ton and over class than normally produced. In addition to this load, the automotive industry will be required to produce a major portion of the required shells; fuses; aeroplane bodies and engines; flying instruments and gun carriages.

Motor vehicles in use in the Army. Upper—One of the many types purchased from the General Motors Corporation. Lower—Motor drawn Field Artillery.

Civilian Military Education

by Lt. Col. Ralph C. Bishop, FA-Res., U. S. A.

Secretary, Civilian Military Education Fund

MILITARY training, as a component of education, had its origin in patriotic impulses manifested over a century ago. When Washington asked Governor Clinton in 1783 for his sentiments upon the future defense of the Republic, the latter suggested military instruction in the colleges.

In 1819, Alden Partridge ("Old Pewt") appeared on the scene, founding the American Literary, Scientific and Military Academy (later Norwich University), first civilian school in the United States to include a course in military training. It drew students from twenty states and territories, and influenced the opening of additional military schools later in the South and the West. A former Superintendent of the Academy at West Point, "Old Pewt" had strong convictions on the educational value of military training. He believed the liberties of the people could be safeguarded only through the wide diffusion of military information. He addressed many audiences in New England on this theme, advancing the argument time and again that "a citizen soldiery is essential to the maintenance of free government."

In passing, it may be of interest to note that Lafayette College was the first civilian institution of higher learning in the United States to incorporate military training. The college was created by charter on March 9, 1863 "for the education of youth in the various branches of science and literature, the useful arts, *military science, tactics* and engineering." Similarly, the Bangor (Me.) High School is believed to have been the first public school to offer it (December 2, 1861).

The factor that gave the first great impetus nationally to civilian military training was the repulses sustained by the Union Army in the early stages of the Civil War, which were attributed to untrained leadership. On July 2, 1862, Abraham Lincoln signed the Land-Grant College Act. Its fourth section, known as the Morrill Land-Grant Act, is reputedly one of the most ambiguously worded measures ever passed by Congress. Its interpretation has been a perennial subject of dispute, often raised in the Courts but never passed upon by any State Court of last resort or by the Supreme Court. All the beneficiaries, with several exceptions in recent years, have interpreted the language "to teach" as obligatory. Thus, the backbone of the Reserve Officers Training Corps, as measured by enrollment and influence, rests with that group of institutions known as the Land-Grant colleges.

The modern R. O. T. C. dates from the National Defense Act of 1916 as amended. Prior to its passage, the educational possibilities of military training were never fully recognized or developed. The rapid changes and refinements in the military art since 1918 finds reflection in the current R. O. T. C. program. The senior course is adjusted in educational content to college levels. Leading institutions, such as Princeton and Harvard, recognize this fact, placing the R. O. T. C. course on the same credit basis as other elective courses.

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While no new units were established in 1937-38, Congress took a step which will have the most fruitful results on the morale and general progress of the R. O. T. C. It provided funds for additional Advanced course students to take care of the 51 units organized in 1936. In September, 1938, approximately 16,600 men will be enrolled in the Advanced course of the senior units, the first mark-up since 1927 when the limitation of 13,870 was imposed. An officer production of 8,000 annually, beginning June, 1940, may now be anticipated.

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(*Continued on page* 129)

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Motorization of the Army

by

Brigadier General R. H. Jordan

Assistant to the Quartermaster General

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The Development of the National Guard

by

Major General Albert H. Blanding

Chief of the National Guard Bureau

SEVENTY-FIVE years ago there was no National Guard in the sense in which we use that term today. In the year of 1863, however, many an ancestral regiment of a present day National Guard unit had already fought with valor upon the battlefields of the War between the States. From North and from South, such regiments as the Richmond Light Infantry Blues, the Boston First Corps Cadets, the Washington Artillery of New Orleans, and New York City's 7th and 69th, had answered the call, and had, in two years of war, established their titles as veteran units. All of these, however, and many others like them, were organized volunteer units from the several States and not, in the full sense, permanent elements of national forces.

Two years before, in 1861, President Abraham Lincoln had said that the recommendation of his Secretary of War for the organization of the State units "on a uniform basis," was a "subject of vital importance to the further safety of the country." On his side, Jefferson Davis, President of the Confederacy had striven toward similar ends. He had asked the States of the Confederacy, also in 1861, to yield to the central government a part of their sovereignty in military matters the better to insure a final victory.

Although both of these great leaders saw clearly three-quarters of a century ago how desirable it was for State troops to come more closely under central control, several decades were to pass before this became an accomplished fact. Now, however, as a result of the Dick Bill of 1903, the National Defense Acts of 1916 and 1920, and the National Guard Status Bill of 1933, the military forces of fifty States and Territories and of the District of Columbia form the largest component of the Army of the United States.

Today, the National Guard contains approximately 200,000 officers and men—citizens of the country who give a surprising amount of their time and energies to military affairs. Its members must now come up to standards of physical condition and professional ability similar to those required of our Regular Army. It is organized into divisions which are under the supervision of corps area commanders in time of peace and under their command whenever a national emergency arises. In time of war, the National Guard will immediately, by present plans, place in the field 18 infantry divisions, one cavalry division, and many other separate units of non-divisional troops.

Already in one great war, the National Guard has proved its importance. Two out of every five divisions that went to France were members of this component. Half of the casualties our army suffered were from National Guard divisions.

Today, the National Guard includes units of every different arm and service that are needed in a modern army. These units have some 1500 home stations spread throughout the States of the Union, the Territories of Puerto Rico and Hawaii, and the District of Columbia. The National Guard is now a fine body of trained fighting men.

Congress annually recognizes the value of the National Guard in our scheme of national defense by substantial appropriations for its support. There is no longer doubt as to the place of the National Guard in our peacetime preparation for defense, and in the first lines of our armed land forces in the event of a national emergency.

Seventy-five years ago, in both of the great armies struggling upon our battlefields, there was a First Maryland Infantry. Indeed, these two volunteer units, with the same designation and from the same State, were, in July of 1863, both within the ranks of the opposing armies at the Battle of Gettysburg. Today there is just one regiment known as the First Infantry (Maryland National Guard), descended from the two that once were in hostile camps. Today this regiment typifies, in its united traditions and in its development to a high state of training and modern military standards, the unity and uniformity which the passage of three quarters of a century has brought to the whole National Guard of the Army of the United States.

State Adjutants General

STATE	NAME	STATE STATUS	FEDERAL STATUS
Alabama	Coleman, John C.	Brig. Gen.	Brig. Gen.
Arizona	Tuthill, Alexander M.	Brig. Gen.	.....
Arkansas	Byrd, Daniel B.	Brig. Gen.	Brig. Gen.
California	Morehead, Harry H.	Brig. Gen.	Brig. Gen.
Colorado	Ardouerl, Alphonse P	Brig. Gen.	Major
Connecticut	Ladd, William F.	Brig. Gen.	Brig. Gen.
Delaware	Stover, Weller E.	Brig. Gen.	Major
Dist. of Col.	Dravo, Charles A.	Colonel	Colonel
Florida	Collins, Vivian B.	Brig. Gen.	Brig. Gen.
Georgia	Stoddard, John E.	Brig. Gen.	Brig. Gen.
Hawaii	Smott, Perry M.	Colonel	Colonel
Idaho	McConnel, Mervin G.	Brig. Gen.	Brig. Gen.
Illinois	Black, Carlos E.	Brig. Gen.	Brig. Gen.
Indiana	Straub, Elmer F.	Brig. Gen.	Colonel
Iowa	Grahl, Charles H.	Brig. Gen.	Brig. Gen.
Kansas	McLean, Milton R.	Brig. Gen.	Brig. Gen.
Kentucky	McClain, George L.	Brig. Gen.	Brig. Gen.
Louisiana	Fleming, Raymond H.	Brig. Gen.	Brig. Gen.
Maine	Hanson, James W.	Brig. Gen.	Brig. Gen.
Maryland	Reckord, Milton A.†	Brig. Gen.	Maj. Gen.
Massachusetts	Cole, Charles H.	Brig. Gen.	.....
Michigan	Bersey, John S.	Colonel	.....
Minnesota	Walsh, Ellard A.	Brig. Gen.	Colonel
Mississippi	O'Keefe, John A.	Brig. Gen.	Brig. Gen.
Missouri	Means, Lewis M.	Brig. Gen.	Brig. Gen.
Montana	Mahan, John W. (Actg.)	Brig. Gen.	Major
Nebraska	Paul, Herbert J.	Maj. Gen.	.....
Nevada	White, Jay H.	Brig. Gen.	Lt. Col.
New Hampshire	Howard, Charles W.	Brig. Gen.	.....
New Jersey	Higgins, William A.	Brig. Gen.	Brig. Gen.
New Mexico	Charlton, Russel C.	Brig. Gen.	Colonel
New York	Robinson, Walter G.	Brig. Gen.	Brig. Gen.
North Carolina	Metts, J. Van B.	Brig. Gen.	Brig. Gen.
North Dakota	Edwards, Heber L.	Brig. Gen.	Major
Ohio	Marx, Emil F.	Brig. Gen.	Colonel
Oklahoma	Barrett, Charles F.	Maj. Gen.	.....
Oregon	White, George A.	Maj. Gen.	Maj. Gen.
Pennsylvania	Kerr, Frederick B.	Brig. Gen.	Brig. Gen.
Puerto Rico	Wilson, John A.	Major	.....
Rhode Island	Dean, Herbert R.	Brig. Gen.	Brig. Gen.
South Carolina	Dozier, James C.	Brig. Gen.	Brig. Gen.
South Dakota	Coffey, Edwin C.	Brig. Gen.	Colonel
Tennessee	Smith Raymond O.	Brig. Gen.	Brig. Gen.
Texas	Nesbitt, Carl E.	Brig. Gen.	Brig. Gen.
Utah	Williams, William G.	Colonel	.....
Vermont	Johnson, Hebert T.	Brig. Gen.	.....
Virginia	Waller, Samuel G.	Brig. Gen.	Brig. Gen.
Washington	Thompson, Maurice	Brig. Gen.	Brig. Gen.
West Virginia	Hornor, Wm. L.	Brig. Gen.	Brig. Gen.
Wisconsin	Immell, Ralph M.	Brig. Gen.	Brig. Gen.
Wyoming	Esmay, Rhodolph L.	Brig. Gen.	Colonel

†Commanding General, Md. Natl. Guard.

National Guard Division and Brigade Commanders

26th Inf. Div. (Mass.), Maj. Gen. Daniel Needham.
51st Inf. Brig. (Mass.), Brig. Gen. Wm. I. Rose.
52nd Inf. Brig. (Mass.), Brig. Gen. Edgar C. Erickson.
51st FA Brig. (Mass.), Brig. Gen. Roger W. Eckfeldt.

27th Inf. Div. (N. Y.), Maj. Gen. William N. Haskell.
53rd Inf. Brig. (N. Y.), Brig. Gen. Bernard W. Kearney.
54th Inf. Brig. (N. Y.), Brig. Gen. Ralph K. Robertson.
52nd FA Brig. (N. Y.), Brig. Gen. William F. Schohl.

28th Inf. Div. (Pa.), Maj. Gen. Edward C. Shannon.
55th Inf. Brig. (Pa.), Brig. Gen. Edward Martin.
56th Inf. Brig. (Pa.), Brig. Gen. Charles B. Smathers.
53rd FA Brig. (Pa.), Brig. Gen. William S. McLean, jr.

29th Inf. Div. (Md., Va., D. C., Pa.), Maj. Gen. Milton A. Reckord.
58th Inf. Brig. (Md.), Brig. Gen. Amos W. W. Woodcock.
91st Inf. Brig. (Va.), Brig. Gen. Samuel G. Waller.
54th FA Brig. (Md., Va., Pa.), Brig. Gen. James C. McLanahan.

30th Inf. Div. (Ga., Tenn., N.C., S.C.), Maj. Gen. Henry D. Russell.
59th Inf. Brig. (Ga., S. C.), Brig. Gen. Treiawney E. Marchant.
60th Inf. Brig. (Tenn., N. C.), Brig. Gen. Don E. Scott.
55th FA Brig. (Ga., Tenn., N. C., S. C.), Brig. Gen. Robert J. Travis.

31st Inf. Div. (Ala., Fla., Miss., La.), Maj. Gen. Albert H. Blanding. (On D.S. as Chief, National Guard Bureau, War Department, Washington, D. C.)
61st Inf. Brig. (Miss., La.), Brig. Gen. Louis F. Guerre.
62nd Inf. Brig. (Ala., Fla.), Brig. Gen. John C. Persons.
56th FA Brig. (Ala., Fla., Miss., La.) Brig. Gen. Sumter DeL. Lowry, jr.

32nd Inf. Div. (Mich., Wisc.),
63rd Inf. Brig. (Mich.), Brig. Gen. Heinrich A. Pickert.
64th Inf. Brig. Wisc.), Brig. Gen. Paul B. Clements.
57th FA Brig. (Mich., Wisc.), Brig. Gen. Irving A. Fish.

33rd Inf. Div. (Ill.), Maj. Gen. Roy D. Keehn.
65th Inf. Brig. (Ill.), Col. Diller S. Myers.
66th Inf. Brig. (Ill.), Brig. Gen. Thomas S. Hammand.
58th FA Brig. (Ill.), Brig. Gen. Samuel T. Lawton.

34th Inf. Div. (Iowa, Minn., N. D., S. D.), Maj. Gen. Mathew A. Tinley.
67th Inf. Brig. (Iowa), Brig. Gen. Lloyd D. Ross.
68th Inf. Brig. (Minn., N. D.), Brig. Gen. David S. Ritchie.
59th FA Brig. (Iowa, Minn., N. D.), Brig. Gen. George E. Leach.

35th Inf. Div. (Neb., Kans., Mo.), Maj. Gen. Edward M. Stayton.
69th Inf. Brig. (Neb., Kans.), Brig. Gen. Amos Thomas.
70th Inf. Brig. (Mo.),
69th FA Brig. (Kansas), Brig. Gen. George H. Wark.

36th Inf. Div. (Tex.), Maj. Gen. Claude V. Birkhead.
71st Inf. Brig. (Tex.), Brig. Gen. Charles W. Nimon.
72nd Inf. Brig. (Tex.), Brig. Gen. Oscar E. Roberts.
61st FA Brig. (Tex.), Brig. Gen. Holman Taylor.

37th Inf. Div. (Ohio), Maj. Gen. Gilson D. Light.
73rd Inf. Brig. (Ohio), Brig. Gen. Ludwig S. Conelly.
74th Inf. Brig. (Ohio), Brig. Gen. Frank D. Henderson.
62nd FA Brig. (Ohio), Brig. Gen. Wm. L. Martin.

38th Inf. Div. (Ky., Ind., W. Va.), Maj. Gen. Robert H. Tyndall.
75th Inf. Brig. (Ky., W. Va.),
76th Inf. Brig. (Ind.), Brig. Gen. Daniel W. DePrez.
63rd FA Brig. (Ky., Ind.), Brig. Gen. Ellerbe W. Carter.

40th Inf. Div. (Calif., Nev., Utah), Maj. Gen. Walter P. Story.
79th Inf. Brig. (Calif.), Brig. Gen. Wallace A. Mason.
80th Inf. Brig. (Calif.), Brig. Gen. Harcourt Hervey.
65th FA Brig. (Calif., Utah), Brig. Gen. Carl A. Badger.

41st Inf. Div. (Wash., Ore., Wyo., Mont., Idaho), Maj. Gen. George A. White.
81st Inf. Brig. (Wash., Mont.), Brig. Gen. Carlos A. Penington.
82nd Inf. Brig. (Ore.), Brig. Gen. Thomas E. Rilea.
66th FA Brig. (Wash., Ore., Idaho), Brig. Gen. Albert H. Beebe.

43rd Inf. Div. (Me., Conn., R. I., Vt.), Maj. Gen. Morris B. Payne.
85th Inf. Brig. (Conn.), Brig. Gen. James A. Haggerty.
86th Inf. Brig. (Me., Vt.), Brig. Gen. Albert Greenlaw.
68th FA Brig. (Me., Conn., R. I.), Brig. Gen. Harold R. Barker.

44th Inf. Div. (N. J., N. Y.), Maj. Gen. Winfield S. Price.
57th Inf. Brig. (N. J.), Brig. Gen Clifford R. Powell.
87th Inf. Brig. (N. Y.), Brig. Gen. Walter A. DeLamater.
69th FA Brig. (N. Y., N. J.), Brig. Gen. Samuel G. Barnard.

45th Inf. Div. (Colo., Okla., N. M., Ariz.), Maj. Gen. Wm. S. Key.
89th Inf. Brig. (Colo., Ariz.), Brig. Gen. William E. Gathner.
90th Inf. Brig. (Okla.), Brig. Gen. Ewell L. Head.
70th FA Brig. (Okla., N. M., Ariz.), Brig. Gen. Raymond S. McLain.

Special Allotment
92nd Inf. Brig. (Minn.), Brig. Gen. Frank E. Reed.
93rd Inf. Brig. (N. Y.), Brig. Gen. Charles G. Blakeslee.
CA Brig. (N. Y.), Brig. Gen. William Ottmann.

21st Cav. Div. (N. Y., Pa.),
51st Cav. Brig. (N. Y.), Brig. Gen. Nathaniel H. Egleston.
52nd Cav. Brig. (Pa.), Brig. Gen. Edward J. Stackpole, jr.
50th Cav. Brig. (N. J.), Brig. Gen. Lewis B. Ballantyne.

22nd Cav. Div. (Ill., Ky., Mich., Ohio, Wisc.),
53rd Cav. Brig. (Ill., Mich., Wisc.), Col. Walter J. Fisher.
54th Cav. Brig. (Ky., Ohio), Brig. Gen. Newell C. Bolton.

23rd Cav. Div. (Ala., Ga., La., N. C., Tenn., Texas.)
55th Cav. Brig. (Ala., Ga., La., N. C., Tenn.), Brig. Gen. James E. Edmonds.
56th Cav. Brig. (Texas), Brig. Gen. Louis S. Davidson.

24th Cav. Div. (Colo., Idaho, Iowa, Kans., Wash., Wyo.), Maj. Gen. William K. Herndon.
57th Cav. Brig. (Kansas, Iowa), Brig. Gen. Raymond A. Venter.
58th Cav. Brig. (Idaho, Wyo.), Brig. Gen. Mervin G. McConnel.

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Generals and Lieutenant Generals of the United States Army

IN the history of the United States Army there have been but four officers to hold the rank of General of the Armies of the United States, only six to hold the rank of General, and fourteen to be Lieutenant Generals.

In the tabulation below, George Washington is included with the Generals, but as a matter of fact he held that rank not in the United States Army, but in the Continental Army.

Under current law, Chiefs of Staff of the Army hold the rank of General while serving in that office and it has been held that they assume that rank upon retirement. (In the picture survey on page 18 of this issue the rank held by officers on the permanent list at the time of their appointment as chief of staff is given.)

Following is a list of those who have held the higher ranks in the United States Army:

★ ★ ★ ★

GENERALS OF THE ARMIES

ULYSSES S. GRANT, July 25, 1866.
WILLIAM T. SHERMAN, March 4, 1869.
PHILLIP H. SHERIDAN, June 1, 1888.
JOHN J. PERSHING, (confirmed as such September 4, 1919.)

★ ★ ★ ★

GENERALS

GEORGE WASHINGTON, June 15, 1775 (in the Continental Army).
JOHN J. PERSHING, October 6, 1917.
TASKER H. BLISS, October 6, 1917.
PEYTON C. MARCH, May 20, 1918.
CHARLES P. SUMMERALL, February 23, 1929.
DOUGLAS MACARTHUR, November 21, 1930.
MALIN CRAIG, October 2, 1935.

★ ★ ★

LIEUTENANT GENERALS

GEORGE WASHINGTON, July 3, 1798.
ULYSSES S. GRANT, March 2, 1864.
WILLIAM T. SHERMAN, July 25, 1866.
PHILLIP H. SHERIDAN, March 4, 1869.
JOHN M. SCHOFIELD, February 8, 1895.
NELSON A. MILES, June 6, 1900.
SAMUEL B. M. YOUNG, August 8, 1903.
ADNA R. CHAFFEE, January 9, 1904.
JOHN C. BATES, February 1, 1906.
HENRY C. CORBIN, April 15, 1906.
ARTHUR MACARTHUR, September 15, 1906.
HUNTER LIGGETT, October 16, 1918.
ROBERT L. BULLARD, October 16, 1918.
EDGAR JADWIN (on retired list August 7, 1929 under operation of Panama Canal advanced rank act of March 4, 1915).

Tobacco's Part in the History of the Armed Services

IN 1863, when the ARMY AND NAVY JOURNAL began publication, tobacco was a fixture in the military life. At that time, the greatest percentage of tobacco users in the Army were those who chewed. Cut-plug, twist and shredded leaf tobacco all had their exponents. Perhaps next in importance from a viewpoint of amount of tobacco consumed were the cigar smokers, while pipes played the minor role of the three.

The tobacco chewers consumed, according to the best available records, more than eighty percent of the tobacco used. It was not unusual to see general officers, many of whom had their own special brand of leaf, produce pocket knives and whittle themselves a healthy mouthful of cut-plug. Down through the ranks and grades of the Army the tobacco chewers extended.

This situation continued for a number of years, although the use of cigars did somewhat lessen the overwhelming preponderence of the chewing element. Observers credit the Crimean War, 1853-1856, with introducing the next major change in the tobacco using habits of the Army. During the Crimean War, when the French, English, Italian, Russian, and Turkish troops operated in close proximity with one another, the cigarettes came into more general use. Up to this time, according to historians of the day, the French troops were the only ones to use the cigarette very generally. The English troops brought the style back to England, from whence American tourists introduced the habit into the United States a number of years later.

The growth of the use of cigarettes was, however, comparatively slow, as many tobacco users had neither the ability nor inclination to "roll their own."

However, even under the "roll your own" handicap, the use of cigarettes made a marked change in the tobacco consumption curve and the number of tobacco chewers showed a decrease. An increase in the production of cigars, accompanied by extensive advertising also contributed to a lessening in the use of cut-plug and twist.

The field remained fairly stable from about 1880 until shortly before the World War, with chewing tobacco maintaining a slight edge on cigarette, cigar and pipe tobacco consumption.

The cigarette consumption in the United States at the outbreak of the World War in 1914 was approximately 30 billion a year. In 1919, five years later, this figure had grown to 85 billion, an increase of over 150 percent. The increase was started when hand factories began turning out "ready mades," and the introduction of completely mechanized cigarette making machines completed the upswing.

The World War is conceded to have been the turning point in the reversal that now finds cigarette smokers in about the same preponderence that tobacco chewers were in immediately after the Civil War.

In the World War, the issue of tobacco to troops became a necessity. It was issued as regularly as the ration. This need for tobacco was recognized not only by the American Army, but the same need was felt by all armies.

Army regulations provide that during time of national emergency, when it cannot be obtained otherwise by the troops, tobacco shall be issued to troops in the same manner as the ration. Each man is allowed either one ounce of smoking tobacco, with papers, one ounce of chewing tobacco or twenty cigarettes. Matches also become a part of the regular issue, with one box issued every two days. The Army thus takes cognizance of the importance of tobacco to the soldier.

It has been estimated that there was purchased by the Quartermaster Corps and donated by civilian organizations, for use of our soldiers during the World War, approximately 10 billion cigarettes, 500 million cigars and 100 million pounds of smoking and chewing tobacco.

From the Civil War to the World War, military leaders knew and gratefully accepted the use of tobacco as a stimulant and nerve tonic.

Today, tobacco products may be purchased by officers and men from the Quartermaster Sales Commissaries, Post Exchanges, Service Clubs and restaurants at the various posts, camps and stations in the United States and its possessions. Standard brands are carried in accordance with the preferences shown by the officers and men.

In time of national emergency, the amount of tobacco bought by the Quartermaster Corps to be distributed as a field ration is considerable.

During the fiscal year 1937, the Quartermaster Corps purchased $1,608,109.72 worth of tobacco products of all kinds. Almost 87 percent of this amount was spent for cigarettes and the greater percentage of the remainder was spent for smoking tobacco for pipe and "roll your own" users.

The table printed below shows tobacco expenditures of the Quartermaster Corps for the fiscal year 1937, the last year for which complete figures are available. This table of course does not include tobacco purchased in the Post Exchanges or outlets other than the Commissaries.

Article	Unit	Quantity Purchased	Total Cost
Cigarettes, 10's	Pkgs.	184,600	$9,910.48
Cigarettes, 20's	Pkgs.	13,586,210	1,329,505.52
Cigarettes, 30's (Overseas)	Pkgs.	499,300	14,952.50
Cigarettes, 50's	Pkgs.	157,372	25,397.96
Cigars, 10's	Boxes	2,995	826.07
Cigars, 20's	Boxes	9,658	11,361.46
Cigars, 25's	Boxes	11,447	12,850.59
Cigars, 50's	Boxes	26,749	38,207.83
Cigars, 100's	Boxes	3,626	9,218.14
Tobacco, Smoking	Lbs.	259,962	152,519.80
Tobacco, Chewing	Lbs.	6,050	3,359.37
Total			$1,608,109.72

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Deck Auxiliaries

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- Anchor Windlass
- Bow and Stern Plane Tilting
- Capstans
- Catapults
- Deck Winches
- Mine Laying and Warping Winches
- Periscope and Antenna Hoists
- Steering Gear

Turret Applications

- Gun Elevating
- Projectile Hoists
- Power Hoists
- Rammers
- Turret Training
- Turret Ventilation

Engine Room Auxiliaries

- Air Compressor High Pressure
- Air Compressor Low Pressure
- Air Conditioning Compressors
- Air Conditioning Circulating Pump
- Auxiliary Circulating Pump
- Auxiliary Condensate Pump
- Booster Pump
- Drill Press
- Dynamo Condenser Circulating Pump
- Dynamo Condenser Condensate Pump
- Engine Lathes
- Evaporator Feed Pump
- Feed Heater Drain Booster
- Fire and Bilge Pump
- Fresh Water Pump
- Fuel Oil Pump
- Fuel Oil Transfer Pump
- Galley Equipment
- Generator Sets
- Hack Saw
- Main Drainage
- Main Circulating Pump
- Main Condensate Pump
- Main Generator Sets
- Oil Purifiers
- Radial Drill
- Refrigerating Air Compressor
- Refrigerating Circulating Pump
- Secondary Drainage
- Shaft Turning
- Shapers
- Trimming Pumps
- Ventilation Fans

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Business-Government Cooperation in War

by

George H. Davis

President, Chamber of Commerce of the United States

I AM sure we are all agreed that no nation in our present industrial era can defend itself against the warlike aggressions of other nations without having the full coperation of its own business and industrial groups.

America's participation in the World War demonstrated how essential to victory are the industry, commerce, banking, transportation and other business activities that make up our peace-time economic life.

As we glance over the European and Oriental scene, it is apparent how nations standing in constant threat of aggression tend more and more to apply to their industrial life government controls, dictated by existing or anticipated military necessity.

It has seemed to me that dictatorship, with the concentration of a nation's economic forces, even in peacetime, under the will, or even the whim, of a single individual, increases the possibility of war between nations. The separation of economics from political life, which obtains in a democracy, seems to me a greater assurance of non-aggression and of the maintenance of peaceful international relations.

In America we are fortunate in that the threat of war is usually remote. We are not beset by neighbors intent on invading our territory or annexing our states. When we think of our defense lines we usually think in terms of a defense line hundreds, if not thousands of miles at sea.

I mention the above because we have developed in America an economic life which no existing military necessity requires should be under constant government domination or control. Free private enterprise, with its appeal to individual initiative which has made America the leading business nation of the world, has not had to be curbed or brought under governmental ownership in order to provide adequate defense against threatening neighbors.

We are thus on a different footing from some of the European nations where international political differences require that certain industries be constantly and accurately geared into the military machine.

The problem of industrial mobilization in the United States therefore has been one of drawing up plans to meet a possible future emergency rather than one to coordinate economic life to a war that is always just around the corner.

The government's industrial mobilization plan is itself built around the principle of throwing our economic resources into wartime gear in such a manner as to assure the quickest possible ending of a war and at the same time as small a disturbance as possible of normal economic peacetime operations.

A plan of this sort, flexible enough to meet changing conditions that arise at any time of war activity, must appeal to any fair-minded man. When a democracy goes to war, it is usually because public opinion has become not merely favorable to such entry but because it has become insistent upon it.

In thinking over this problem of industrial mobilization—one which existing legislation places upon the Assistant Secretary of War—I began to scan our own organization to see just what our part might be were such an unwanted emergency as war brought upon our nation. I appreciate that the office of the Assistant Secretary already has contacts with industries essential to defense in every part of the country. Many of the concerns that have been contacted are members of our organization.

Yet every great emergency hatches a thousand and more problems of the most unexpected sort—problems which require the utilization of the most effective machinery available for the gathering of required information, the solution of urgent problems, and quick action.

In an organization like our own, with more than a thousand member chambers of commerce throughout the United States, and with more than four hundred trade associations, in vital branches of American business life, we have what comes pretty close to being an ideal setup for quick action and effective cooperation.

In each one of our member organizations we have constant contact throughout the year, not only with the president of the organization and with the secretary, but also with an officer known as a national councillor, who might be termed a liaison man from his organization to the National Chamber, tied in closely with all Chamber activities throughout the year.

In time of emergency also we could cooperate with the government through our Division Offices, located in New York, Atlanta, Chicago, Dallas, Minneapolis, and San Francisco, each under the executive direction of a vice president of the Chamber.

The Chamber's contact with business life has also been developed effectively during the past two decades through the operation of eleven service departments, representing the major economic functions of American business.

Each of these Departments is not only staffed by trained men but has guidance and advice of a Department Committee, composed of some ten to twenty business men experienced in the respective fields. And in addition, we have some fifteen or more special committees, dealing with topics of present-day interest—a number that could be quickly doubled or tripled if national emergency made such action advisable.

Taking this cross-section of business organization, project your minds if you will, to a cross-section of American business from coast to coast and from border to border. It is a great, voluntary, yet effectively coordinated business system. It has displayed unexampled efficiency. It is a system which operates best under the hand of those who throughout the years have become familiar with its intricate mechanism. With little readjustment—with guidance as to what its job is in supporting military operations—it can be highly effective in defending America against all comers.

In our national interest it is of highest importance to preserve the efficiency, flexibility, and enthusiasm of our American business system. What helps business contributes to American progress. What helps business assures continuance of an effective business mechanism. What helps business contributes to national defense. And what helps business helps the men upon whom our nation relies when crisis or emergency comes.

Steel

(*Continued from page* 87)

built up of plates of wrought iron and in some cases slabs of cast iron bolted with wrought iron bolts. Today we have armor plates that will resist the most powerful guns built and indeed we have advanced far from the first "armored" vessels built in this or any other country.

The question might well be asked: "Why should a tensile strength of 60,000 pounds per square inch, with an elongation of 25%, have been adopted almost universally as the specification for the greater proportion of steel entering into ship construction when a choice is available from such a great range of characteristics?" The answer is that this specification, in the present state of the art of steel making and shipbuilding, is the best compromise of the various characteristics that might have been selected. It may be a new idea that engineering is ever a compromise. As a matter of fact, sound engineering is nothing but a compromise, as it can never be an exact science. The engineer must be governed not only by what he considers to be the ideal material for the finished product, the ship being the finished product in this case, but he must also consider such questions as availability of supply, first cost and the problems of fabrication in connection with producing the finished product.

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Ordnance in War Reserve

by Brigadier General Earl McFarland

Assistant to the Chief of Ordnance

PRIOR to our entrance in the World War, the American people were lending an attentive ear to news of foreign wars and were following current battles and campaigns with more than passing interest. But when it came to the matter of our own military preparations, the subject was treated with indifference. The average man on the street gave little thought to the meaning of military preparedness and little concern as to how he would be affected by war or the preparation for war. Some members of the Congress and the military service, apprehensive of our position, had advocated the building up of stocks and reserves to take us through the early months of a war, realizing that only a war reserve could meet the pressing need for guns and ammunition between M-day and X-day —the day our commercial industries could be put on a munitions producing basis.

In 1913 the Ordnance Department drew up and printed its "war plan" which states a policy for war reserves setting out the basic principle still adhered to:

> "* * * sufficient arms, equipment, and ammunition would be on hand either in the hands of troops or in store for the enlarged Regular Army and the enlarged militia, with a surplus for an additional volunteer force, and which surplus would be greater in some articles than in others, being designed to be greatest in those things which take the longest time for their production * * *"

This emphasizes clearly the difference between required items of commercial manufacture and those pertaining exclusively to a military program.

In 1915, during the first term of Mr. Wilson's presidency, the Congress passed a law which authorized the procurement by the War Department of supplies to be accumulated for use in future years. This may be considered as the first step in the congressional sanction for the building up of the war reserve of the United States. This sanction, now a mandate, fits exactly into the picture of the industrial mobilization program demanded by the National Defense Act of 1920.

At the time troubles were brewing along the Mexican Border reserve stocks of ordnance material sufficient to equip an expeditionary force were stored at Rock Island Arsenal. This material was segregated and arranged in special warehouses so that it could be immediately placed in freight cars and shipped without delay. Beyond such small activities as this, practically nothing was done to build up a war reserve prior to 1919. However, we are now well aware of the necessity for such a reserve by reason of the known difficulties and delays encountered during the World War in changing over American industry to the position of being able to provide for our troops on the battlefields of France.

The signing of the armistice found our industrial organization keyed to high pitch in the production of war materials. We were turning out munitions at an unprecedented rate and the flow had to continue for a number of months after hostilities ceased. Before production could be stopped, a large accumulation of war supplies was on hand. Some advanced thinkers having in mind the condition in which we found ourselves at the opening of the war thought that something should be done about retaining a certain amount of this vast war stock as a War Reserve. But the public in general was through with war. It was not a propitious moment to think about future conflict. The National Defense Act had created the Organized Reserve, ROTC, and the CMTC and had provided for the reorganization of the National Guard. In order to provide equipment for these new organizations, Congress stated that they would be supplied from surplus and reserve stocks on hand in the War Department. Through such issues and due to deterioration, this policy before many years would have depleted our War Reserve stocks and we would have been in a position similar to that in which we found ourselves at the outbreak of the World War. Becoming aware of this, Congress in 1924 added the well-known proviso to the War Department appropriation act that "no issues of reserve supplies or equipment shall be made where such issues would impair the reserves held by the War Department for two Field Armies or 1,000,000 men." This was a direct order from the law-making body of the country to set up definitely a War Reserve. This proviso was retained in all appropriation acts from 1924 up to and including the Fiscal Year 1938. The deletion of this proviso from the 1939 appropriation act was compensated for by other changes in the act.

Though the quantity of ordnance materials in reserve is far from adequate, the American public now recognizes the necessity of maintaining such supplies. This fact is reflected in the efforts and attitude of the Congress. Our lawmakers appreciate that although we are the foremost industrial nation in the world, it is nevertheless imperative to maintain in time of peace sufficient munitions to carry us through the first few months of a war emergency or until the country's industries can convert their activities from peacetime products to war-time essentials.

Expenditures Since 1863

THE following table shows expenditures by the War and Navy Departments from 1863. It should be noted that the figures, furnished by the Treasury Department, are exclusive of civil expenditures in Washington prior to 1916 but include expenditures for Rivers and Harbors and the Panama Canal. Also, the figures for 1938 and 1939 are the totals of appropriations, those for expenditures not being available.

Year	War Department (including rivers and harbors and Panama Canal)	Navy Department
1863	$599,298,601	$63,221,964
1864	690,791,843	85,725,995
1865	1,031,323,361	122,612,945
1866	284,449,702	43,324,118
1867	95,224,415	31,034,011
1868	123,246,648	25,775,503
1869	78,501,991	20,000,758
1870	57,655,676	21,780,230
1871	35,799,992	19,431,027
1872	35,372,157	21,249,810
1873	46,323,138	23,526,257
1874	42,313,927	30,932,587
1875	41,120,646	21,497,626
1876	38,070,889	18,963,310
1877	37,082,736	14,959,935
1878	32,154,148	17,365,301
1879	40,425,661	15,125,127
1880	38,116,916	13,536,985
1881	40,466,461	15,686,672
1882	43,570,494	15,032,046
1883	48,911,383	15,283,437
1884	39,429,603	17,292,601
1885	42,670,578	16,021,080
1886	34,324,153	13,907,888
1887	38,561,026	15,141,127
1888	38,522,436	16,926,438
1889	44,435,271	21,378,809
1890	44,582,838	22,006,206
1891	48,720,065	26,113,896
1892	46,895,456	29,174,139
1893	49,641,773	30,136,084
1894	54,567,930	31,701,294
1895	51,804,759	28,797,796
1896	50,830,921	27,147,732
1897	48,950,268	34,561,546
1898	91,992,000	58,823,985
1899	229,841,254	63,942,104
1900	134,774,768	55,953,078
1901	144,615,697	60,506,978
1902	112,272,216	67,803,128
1903	118,629,505	82,618,034
1904	165,199,911	102,956,102
1905	126,093,894	117,550,308
1906	137,326,066	110,474,264
1907	149,775,084	97,128,469
1908	175,840,453	118,037,097
1909	192,486,904	115,546,011
1910	189,823,379	123,173,717
1911	197,199,491	119,937,644
1912	184,122,793	135,591,956
1913	202,128,711	133,262,862
1914	208,349,746	139,682,186
1915	202,160,134	141,835,654
1916	183,176,439	153,853,567
1917	377,940,870	239,632,757
1918	4,869,955,286	1,278,840,487
1919	9,009,075,789	2,002,310,785
1920	1,621,953,095	736,021,456
1921	1,118,076,423	650,373,836
1922	457,756,139	476,775,194
1923	397,050,596	333,201,362
1924	357,016,878	332,249,137
1925	370,980,708	346,142,001
1926	364,089,945	312,743,410
1927	369,114,122	318,909,096
1928	400,989,683	331,335,492
1929	425,947,194	364,561,544
1930	464,853,515	374,165,639
1931	478,418,974	354,071,004
1932	477,449,816	357,617,834
1933	449,395,013	349,561,925
1934	408,894,976	297,029,291
1935	489,155,454	436,447,860
1936	618,919,108	529,031,666
1937	628,348,231	556,884,449
1938	663,850,855	588,086,812
1939	657,453,101	586,555,577
Total	$33,736,652,078	$15,107,598,638

Optical Glass - Its Potential Value to National Defense

by

Major Roy L. Bowlin, U. S. A.

Executive Officer, Rochester Ordnance District

THE problems of war are linked with the problems of peace. The technique and wealth of countries are developed under peaceful conditions and mobilized of necessity when a nation's existence is at stake. Under this pressure, extraordinary results are often achieved in a short time because of the ability of the government to secure coordination of many related activities by different groups.

The United States was under compulsion to produce optical glass during the World War since all imports of the material had ceased. Since the method of its manufacture was a secret, controlled primarily by two firms in two foreign countries, unusual difficulties existed in discovering the peculiar technology required to produce an acceptable product. Fine optical glass for precision instruments is even today made by a comparatively few firms in the entire world.

Naturally an institution such as Bausch & Lomb, whose bread and butter rests on this raw material, was concerned about the supply. As far back as 1905 tentative experiments were made in the production of optical glass. No concern was felt, however, since foreign supplies were ample and the outlook unclouded.

By 1912, the company had come to realize that it was the part of business expediency to learn to make this material. William Bausch, with the aid of a young Belgian, enlarged his experimental work. With the failure of the first oil-fired furnace to produce a successful product, a new plant was built containing two gas-fired furnaces.

In the spring of 1914, with the outbreak of hostilities in Europe, efforts were increased to solve the numerous problems involved, for it was apparent that tremendous dislocation would occur in (*Continued on page* 103)

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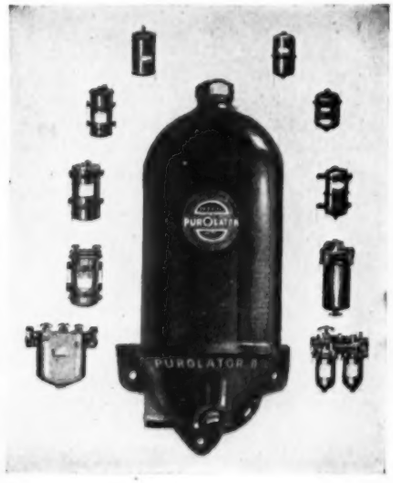

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The Bureau of Navigation

To Insure the "Adequacy and Efficiency" of Navy Personnel

by

Rear Admiral J. O. Richardson, U. S. Navy

Chief of the Bureau of Navigation

THE founding of the Bureau of Navigation dates but one year before the anniversary period of the ARMY AND NAVY JOURNAL which this issue commemorates. In 1862 Congress added the Bureau of Navigation as one of three new bureaus created to augment five established in 1842 as the first "Bureau System" of the Navy.

The Bureau, as originally founded, was to be a purely scientific bureau. To it were assigned the Hydrographic Office and Naval Observatory. Personnel had previously been handled directly by the Secretary's Office, without assignment to any specific bureau. At this time, however, the Secretary, while retaining responsibility for officer personnel, transferred to the newly created Bureau of Equipment and Recruiting all matters concerning enlisted personnel after apprentice training.

The scientific isolation of the Bureau of Navigation did not long continue, as in 1864 all matters concerning naval apprentices were assigned to the Bureau of Navigation and in 1865 the responsibility for detailing officers to duty was similarly assigned to the Bureau.

In the post-Civil War doldrums no change was made for nearly twenty-five years in this distribution of duties, except the creation of the Office of Naval Intelligence, under the Bureau of Navigation, in 1882. In 1889 all the enlisted personnel activities were transferred from the Bureau of Equipment and Recruiting to Navigation, thus giving the Bureau cognizance over all matters relating to personnel, a responsibility which has since remained vested in the Bureau. At that time, too, the administration of the Naval Academy, originally part of the Secretary's Office and later under the Bureau of Ordnance and Hydrography, was also transferred to the Bureau of Navigation, thus adding the procurement and training of naval officers to its earlier duties of assigning them to stations.

Momentarily the Bureau lost any contact with scientific activities, since, in compensation for the loss of its enlisted personnel activities, the Bureau of Equipment received charge of the Hydrographic Office, the Naval Observatory, and the new art of electric lighting, previously under the Bureau of Navigation. These activities, except for electric lighting, earlier transferred to the Bureau of Steam Engineering, were returned to the Bureau of Navigation in 1909.

From its successive assumption of these duties, and its additional responsibility under the Secretary of correspondence relating to the movements of ships and their availability for sea-service, the Bureau of Navigation grew from its early start as a scientific agency to a position of major influence within the Navy Department. Two outstanding Chiefs of Bureau, Commodore Walker and Rear Admiral Ramsey, each serving for eight years, 1881-1889 and 1889-1897 respectively, strengthened and developed that influence. C. O. Paullin writing of that period says:

> "The Office of the Chief of Bureau adjoined that of the Secretary, to whom he had easy access and whose ear he could gain and keep to a greater extent than the other Chiefs of Bureaus. He was more frequently with the Head of the Department than any of his colleagues and was in a position to give the Secretary his naval point of view, . . ."

Thus, in the later days of the last century and in the earlier days of this, the Bureau of Navigation was not only one of the several coordinate bureaus of the Department but also was the Secretary of the Navy's right hand in administering the ships and the personnel of the Navy.

In 1909, however, the system of Four Aides, for Operations, Personnel, Material, and Inspections, respectively, was instituted and shortly thereafter in 1915 the present Office of Naval Operations, headed by the Chief of Naval Operations, was established. With the assignment to the Chief of Naval Operations of some of the duties theretofore performed by the Bureau of Navigation, the Bureau reverted once more to its primary responsibility —the personnel of the Navy.

Its present duties may best be described by quoting in part the Chief of Bureau's statement to the Appropriations Committee in December, 1937.

> "The Bureau of Navigation is the personnel Bureau of the Department. Its primary mission is to provide for and to maintain the efficiency and adequacy of all personnel necessary to meet the peace and war requirements of the United States Fleet and of the naval activities contributing to its support. Under the direction of the Secretary of the Navy it is charged with and responsible for the procurement, education, training, discipline and distribution of officers and enlisted personnel, including the Naval Reserve and the Reserve Officers' Training Corps, except the professional education and training of officers and men of the Medical Corps. The Bureau is therefore concerned with the personnel interests of the Navy as a whole, line and staff, officers and enlisted. Other bureaus and offices make recommendations to the Bureau of Navigation with respect to the procurement, education, training, and distribution of officers for duties under their respective cognizance, but no bureau other than the Bureau of Navigation is charged with the control or supervision of any particular corps.
>
> "The Bureau is also charged with the supply and maintenance of ships' navigational equipment; with hydrographic surveys in foreign waters; with the publication and supply of charts, sailing directions, and nautical works; the collection of all nautical, hydrographic, and meteorological information and its dissemination to ships and aircraft; and with pilotage, towing and related services.
>
> "It is further charged with the upkeep and operation of the Naval War College, Naval Academy, Post Graduate School, Training Stations, schools for enlisted men, Naval Observatory, Hydrographic Office, and the Naval Home."

This brief history of the Bureau would not be complete without mention of its part in the activities of the Navy during the World War. In pursuance of its duties of procuring, training and assigning officer and enlisted personnel of the Navy, the Bureau developed the personnel from a pre-war strength, on January 1, 1917, of 4,000 officers and 55,000 men of the regular Navy and 9,000 reserves, to a total strength, officers and men, on Armistice Day of 531,198. These officers and men were more than mere names on a roster sheet. They were trained and competent personnel discharging the naval responsibilities of our share in the World War. A few examples as quoted from the Secretary of the Navy's report of 1919 may illustrate this naval expansion:

> "The Navy manned and officered 121 transports requiring 49,350 men and 2,480 officers, more men and officers than the Navy had altogether on sea duty on the day when the war was declared. In addition to those vessels of the transport force more merchant vessels and freighters engaged in the service of supply were manned and operated by the Navy than there were naval vessels in commission on the date of the declaration of war. On the day that the armistice was signed, there were many thousands more officers and men of the Navy on service overseas than there were in the Navy prior to the war. The Navy transported to Europe 912,520 troops, and brought back from Europe 1,626,339 troops."

At present the Bureau of Navigation does not anticipate the immediate necessity of any such effort for any such war, but its daily concern is to insure the adequacy and efficiency of the personnel of the peace-time Navy and to be prepared to meet any demands that any emergency may thrust upon the Navy. It is convinced that the caliber of the present officers and men of the Navy is equal and perhaps superior to that at any time in the past. It believes that the Nation can look with confidence to the personnel of the Navy to serve capably and effectively as its First Line of Defense.

U.S.S. Drayton, Commissioned Sept. 1, 1936

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U.S.S. Gleaves and Niblack due in commission in 1940
U.S.S. Grayson and Eberle due in commission in 1940 and 1941

Dentistry in the United States Army

by

Brigadier General Leigh C. Fairbank

Assistant to the Surgeon General, U. S. Army

SEVENTY-FIVE years ago the only dental treatment provided by the Army was furnished by medical officers and was limited to extractions. The teeth were of military significance, however, for during the Civil War "the surgeon was directed to ascertain whether drafted men or substitutes had a sufficient number of teeth in good condition to masticate their food properly and to tear their cartridges quickly and with ease. The cartridge was torn with the incisors, canines or cuspid teeth." There were about 1,200 dentists in the States at this time and many of these patriotic citizens enlisted as line soldiers, some of them taking a few instruments along to relieve their companions when called upon. Kingsley, Gunning, and Gibson were among the dentists who contributed to the health and comfort of our wounded in the Federal hospitals. They were capable men who distinguished themselves in the treatment of maxillary fractures and gun-shot wounds of the face.

The first provision for dental care for the West Point cadets was made in 1868, when a Dr. Saunders, a retired Hospital Steward, was engaged to attend the cadets. He served at West Point for over forty years. This action of the War Department brought to the attention of Congress the past neglect of our soldiery, and Senator Hamlin of Maine introduced a bill in Congress (1868) providing for dentists. This was cast aside, due very largely to economies then in force. For the next thirty years the only real dental treatment available for officers and men was provided by civilian dentists close to Army stations or by traveling dentists who moved from station to station rendering such treatment as their limited equipment or skill made possible—always at the personal expense of the patients.

Dentistry of this era was developing rapidly in a mechanical way and gaining recognition. Whatever it lacked in background it made up by the zeal and sincere purpose of an increasing number of distinguished men. Medicine was in a period of amazing development and dentistry, striving for a more scientific basis, endeavoring to establish a better health service, and working for a closer relation with medicine, moved forward in the wake of the parent profession.

During the Spanish-American War the great need for Army dentists was more evident than ever. With our troops in the South, Colonel L. M. Maus, M. C., found dentists among the volunteers and established them in offices where they rendered splendid service for the suffering men. Colonel W. O. Owens, M. C., did the same for the troops on the West Coast. These two instances furnish us with examples of the recognized need for an Army dental service.

Essential for any profession is a historical background of growth. It is vital in plans for its future progress and development. Medicine had centuries of growth since it passed from the barber-surgeon stage. Less than 100 years ago the first dental school was organized. From its humble beginning dentistry encountered the rebuffs and affronts comparable with the trials through which medicine passed. The Army was slow

(*Continued on page* 136)

Seventy-five Years of Army Nursing

by

Major Julia O. Flippe

Superintendent, Army Nurse Corps, Office of The Surgeon General, U. S. A.

SEVENTY-FIVE years ago there were a few hospitals in the United States that admitted women for a limited amount of training in the art of nursing, but it was not until 1872 that the first recognized schools of nursing were established. Consequently, during the Civil War while female nurses, including Sisters of Charity, served in general and corps hospitals and on hospital steamers on the Ohio and Mississippi Rivers, they were not graduates and only those with special ability, intelligence and experience were employed in nursing particular cases. Male help was preferred in the general wards, and the sphere of women usually was restricted to the extra diets, supervision over the linen, laundry and contribution rooms. However, their accomplishments under the most adverse conditions were outstanding and their record of courage, devotion and fortitude as typified by such figures as Dorothea Linde Dix, Louisa May Alcott, Mrs. Bickerdyke, Emily Parsons, Mrs. Fales and "Sister Tyler" is a heritage of which American womanhood may well be proud. The army nurses during this period, numbering approximately 6,000, consisting of both white and colored women, were allowed a 40 cent ration and $12.00 and $10.00 a month respectively.

With peace the sick of the army was again nursed by the soldier detailed from a company for hospital duty. To quote "a job no one wanted. The pay was extra duty, but the duties the men had to perform did not suit them."

Undoubtedly the experience of the women in army hospitals during the Civil War disclosed the need for the professional nurse, and gave impetus to the establishment of schools of nursing throughout the country. By 1898 there were over 500 schools that had graduated approximately 10,000 nurses. It therefore followed that when in April war with Spain was declared, a large group of professional nurses stood ready and anxious to meet their country's need. Offers of service from individual nurses poured into the War Department, but it remained for one woman with foresight, experience, and unusual ability to present to the Surgeon General a concrete plan for an organized group of trained women nurses to serve during the emergency —Dr. Anita Newcomb McGee. The Surgeon General, who had foreseen the necessity for a large force of trained nurses at general hospitals, promptly accepted this plan and by May 10 had made contracts with five women nurses. In July many were on duty at general hospitals of the army in Cuba. Cuba, Puerto Rico, Hawaii and the Philippines knew them before June 30, 1889, and China in August 1900. With the suppression of the typhoid epidemic and muster out of volunteer regiments, contracts were annulled and on July 1, 1899, there remained in the service 202 nurses. These had been organized into a "female nurse corps" under the superintendence of Dr. Anita Newcomb McGee, who in August 1898, had been made an Acting Assistant Surgeon. The corps consisted of a superintendent, chief nurses, nurses and reserve nurses.

The Army Reorganization Bill, which became a law February 2, 1901, made provision that the Medical Department should consist of certain officers, the Hospital Corps and the Nurse Corps. The structural framework set up under Section 19 of this act, expanded and improved to meet modern practices of medicine and nursing, is today as it was then. The pioneer work was done, the trained nurse had proved herself as necessary to the best

(*Continued on page* 136)

Optical Glass

(*Continued from page 99*)

the optical industry in this country unless optical glass could be successfully produced. Some of the scientific societies, whose members were dependent on optical instruments, showed signs of alarm at their annual meetings.

It was in June 1915, after endless trials and great expense, that both light crown and dense flint glass was produced successfully. And by the summer of 1916, several types of glass were at the annual conventions of the American Medical Association and the American Optometric Association, thus allaying fears of the professions.

When the United States entered the war a committee was appointed from the Naval Consulting Board to inquire into the supply of optical glass of a quality suitable for fire control instruments. This was the first action ever taken by the government to obtain a supply of this product.

The situation was immediately found to be precarious. The war had been going on for nearly three years and imported glass had become exhausted in supplying equipment to the allied powers. The report by Mr. Baekeland, Chairman of the Committee of the Naval Board, recommended that the matter be placed in the hands of the Bureau of Standards. The next active step was taken by the National Research Council in April, 1917, a few days after our declaration of war, when Dr. Arthur L. Day, of The Geophysical Laboratories, began a survey of sources.

Dr. Day was pleasantly surprised to discover that Bausch & Lomb was able to make optical glass at the rate of approximately 2,000 pounds per month, but the requirements of the Army and Navy were placed roughly at 2,000 pounds per day.

Although four other small plants, including that of the Bureau of Standards, were experimenting in the production of optical glass, they had never been able to produce any of strictly optical quality.

The situation was so precarious that the National Research Council called on the Geophysical Laboratories of the Carnegie Institution to join in studies to increase production and improve the glass. In accordance with this plan silicate chemists, headed by Maj. F. E. Wright, came to Rochester to aid the management in setting up standards and in securing raw materials of sufficient purity for optical glass.

The qualities sought in optical glass are homogeneity, freedom from color, a constant refractive index and a constant dispersion ratio, high transparency, durability under exposure, and freedom from internal strains and stresses caused by poor annealing. When the optical engineer prescribes one of the several types of glass he must ordinarily have its refractive index held to one unit in the third place and its dispersion coefficient held to one-tenth. These tolerances are met only by the most painstaking effort in the selection of materials, constant control of the processes and strict adherence to previously determined conditions.

To obtain the desired results it was quickly realized that the pot was an important factor in glass making. Pot after pot was lost by small inclusions of iron which ruined the glass for use in precise instruments. The clay which had been used in pots for glass melting had been coming from abroad. No pots of sufficient purity were obtainable in this country.

Although the records of the United States Geological Survey showed that clays were available in greater quantity and variety than in any of the European countries, there was a lack of adequate knowledge about their use. However, a canvass of sources in this country was made through the efforts of the National Research Council and the General Munitions Board under Dr. Days direction. This canvass brought to light clay sources of unusual purity and a method was devised for further extraction of iron.

One of the difficulties in immediate pro-

(*Continued on Next Page*)

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Optical Glass

(*Continued from Preceding Page*)

duction was the necessity to season or cure the pots for five months or more. For the first three months the temperature and humidity must be carefully controlled to insure gradual, uniform shrinking and to prevent cracking. When a new pot is required, it is necessary to take one that has been gradually heated in a pot arch. Over a five-day period it is gradually raised to a temperature of around 1800° F.

Unfortunately, in the making of optical glass for instruments the glass must be annealed in the pot, after which the pot is destroyed by chipping it away from the annealed chunk. The usable glass obtained from a 600 lb. pot rarely exceeds 25%, which accounts for the cost of this product when compared with ordinary commercial glasses.

For the optical instruments required by the government in April, 1917, to control its gun-fire on the sea and at the front, nine different types of optical glass were necessary, and but two of these had ever been successfully made in this country before. The seven others were shrouded in mystery and no aid was obtainable from our allies on this subject. Both Great Britain and France had recognized the optical industry as a key industry and given it protection in ordinances designed to protect the home industries in their experimental work.

It may be said, however, that such progress was made in this country, under the spur of necessity, that when our troops were engaged in the crucial fighting of 1918 all demands were met. In fact, certain types of optical glass were demanded that had been produced in no country previously.

For instance, the airplane soon became indispensable for photographic mapping. This meant airplane cameras of wide sweep and very high precision, of a quality beyond anything previously attempted. Although the requirements for such lenses were known, no glass had ever been produced to meet them.

This problem was brought to Edward and William Bausch by Dr. Day. It was the hardest task they had yet encountered. The glass was a barium type, thin as water when melted, and totally different in its behavior from any glass hitherto attempted. It soaked into the melting pots like coffee into a lump of sugar and ran out through the sides. In every detail it required a totally different treatment from glasses thus far developed. Nevertheless, within four weeks it was successfully made and actually used at the front.

At the conclusion of the war, having produced more than 65% of the total requirements of the government, Bausch & Lomb continued the manufacture of optical glass, launching into a program of research and development which has resulted in producing finer glass and in greater variety.

Listed as one of the twenty-three most vital materials in the event of war, optical glass is of paramount importance to make optical instruments for our armed forces. To sustain its manufacture in this country, against foreign competition, we must do as the European countries have done and recognize the necessity to protect it in peace time. Continued research, improved techniques and an adequate supply depend upon the growth of the optical industry in the United States during periods of peace. The production of range finders, periscopes, gun sights, telescopes and searchlight mirrors, depends in the end upon the domestic sale of microscopes, ophthalmic lenses, and thousands of other optical items which are made for the precise needs of research workers in the daily progress of science and industry in this country. Without this business, it might be impossible to keep American Industry supplied with the best in optical glass from American source and in another emergency we would again be faced with the necessity of building up an exacting technique with less time to do it than previously.

The Optical Industry is important to National Defense and National Defense is important to our American Optical Industry.

Coast Defenses

(*Continued from page 75*)

factor in modern war has brought its problems no less than those brought by rifled cannon and modern armor plate. The problem of the water-borne enemy has been solved. We are coping now with the menace from the sky. In the field of antiaircraft, it has been demonstrated that the gun can bring down the plane. Given adequate equipment and personnel, an enemy air force can be made just as chary of penetrating skies combed by antiaircraft guns as we have made fleets discreet about coming within gun range of a harbor fort. In fact, harbor defense including submarine mines and aerial defense go hand in hand and require the Coast Artillery to provide defense "in the heaven above * * * in the earth beneath or * * * in the water under the earth." Mutually dependent as they are, their organization into one capable force gives an adequate solution to the problem. Their role is purely defensive, and they are the first bulwark of any Army Protective Mobilization Plan.

The variant types of equipment handled by the Corps today make it necessary for the Coast Artilleryman to be a veritable artillery jack-of-all-trades. He mans railway guns, tractor-drawn artillery, swiftly-moving antiaircraft batteries, and even goes down to the sea in ships in mine planters. He does his best to adapt himself to conditions in a changing military world; and he prepares for contingencies that many people classify as remote. An improvement in the other fellow's weapons or a shift in our industrial centers may call for a change of technique on our part. What was yesterday strategically in style may be tomorrow very much out of mode.

But, however military styles may change or conditions differ, the Coast Artillery Corps should be one jump ahead. The Coast Artilleryman uses in the field, apparatus scaled to laboratory accuracy. Much of this is very complicated, and it is constantly being modified to keep abreast of scientific advancement. Mental alertness on the part of officer personnel is imperative. Our antiaircraft artillerymen are constantly delving deep into science to improve their technique against the threat from the air.

The mission of the fixed and mobile defenses is a primary one. It cannot be too strongly emphasized that harbor defenses form the backbone of our National Defense scheme. Since their part is played earliest in the event of war, it would seem the cheapest of national insurance to provide for the maintenance of a Coast Artillery Corps strength in peacetime equal to that required in the initial stages of mobilization. No one who has the interest of his country at heart will want this nation to meet again an emergency with equipment and personnel comparable to that which we had — relatively speaking — when the Spanish War alarmed our shores.

A cursory examination of the geographic position of the United States will reveal the fact that a real threat to our safety is most likely initially to come only from the sea and the air. Situated as we are, the Pacific and Atlantic Oceans provide the finest coast defense any nation ever had. Just a little Coast Artillery trimming along our borders of these water areas will make the defense well nigh perfect. To safeguard our water and aerial frontier further, our people would do well to insist that the harbor defenses and antiaircraft units of the Army be furnished with materiel and man power second to that of no other nation.

To the ARMY AND NAVY JOURNAL — Many happy returns of the day!

Army Construction

(*Continued from page 81*)

was beneficial to industry itself and potent in its reconstruction and advancement for post war service. The spruce industry will illustrate:

Spruce is a timber which, while useful in many ways, had little peace time value and was produced in the Northwest only as a by-product of fir logging. However, with the war came the discovery of its utility for air plane construction, and by October, 1917, the demand for this timber reached ten million feet per month. Civilian concerns were producing about 1,250,000 feet per month. No organization was equipped or financially strong enough to undertake production to this extent. Consequently in November, 1917, the Spruce Production Division under the direction of Brigadier General Brice P. Disque was organized for the purpose. Within six months spruce production passed the ten million mark and within a year the output was approximately 25,000,000 feet per month. To achieve this the Division had constructed three large cutting mills, two of them the largest in the world, with a fourth partially completed. One hundred thirty miles of railroad had also been constructed and new tracts of forest containing billions of feet of spruce and other timbers opened up. These developments were largely permanent contributions to the lumber industries of the Northwest.

At the close of the War stark retrenchment in military expenditures reduced housing conditions at Army stations to a very low state of adequacy. Meantime war scares spread with new virulence throughout Europe and further neglect of the defense system of this country appeared highly imprudent. Congress therefore authorized the preparation of programs to provide for its rehabilitation and modernization and for a modernized air service. In 1927 appropriations were initiated for starting this work.

The value of the Army Housing plant (not including fortifications and technical installations) may be estimated roughly at about $500,000,000. The proposed additions to this plant together with restoration and replacements will, it is estimated, total about $300,000,000. Rightfully, the accomplishment of this work should not be delayed beyond a dozen years. This signifies an average outlay of $30,000,000 per year for Army new construction. In addition normal repairs to existing housing will average perhaps $10,000,000 a year. Thus, with a modern defense system to strengthen and maintain, the Army contribution to the general construction industries would be a considerable item if appropriations were made available.

Ten to fifteen percent of the above amount would go to the lumber industry. In war construction, however, this percentage would appreciably increase. Cantonments, ships, wharves and other facilities would require lumber on a vast scale. Nevertheless, this demand would be of little advantage to the lumber industry since war demands for construction materials are almost invariably offset by a recession in civilian demand. Moreover, lumber construction in war is usually a total loss and correspondingly depletes the country's timber reserves. At the cessation of war lumber prices under the impact of the accumulated civilian requirements would invariably rise, perhaps never again to recede. This augments the financial burdens of the middle class home owner and renter, and the ultimate effect is a depreciation in the living standards of the nation. To obviate this, two things appear necessary:

(1) The extension and acceleration of reforestation and afforestation activities.

(2) The development of a cheap building substitute for lumber.

The Army favors both.

U. S. Military Academy

(*Continued from page 70*)

to the honor roll of the nation's greatest citizens."

Thus, the ground was laid to prepare the Academy for its next great test, the World War. The manner in which it met the nation's needs is recorded in the comment of the late Newton D. Baker, then Secretary of War, "In the World War, West Point again demonstrated its supreme value to the country in the hour of need. Our great overseas army was made and led by West Point men and the incredible swiftness with which it was trained for its great task is a tribute to the fineness of the raw material and also to the leadership generated by West Point. In all walks of life character is the indispensable basis of enduring success. West Point does many things for its men, but the highest quality it gives them is character and in the emergency of the World War, our success rested on the character of our leaders. It, therefore, finally rested on West Point."

While graduates were meeting the demands of the service on battlefields and in training camp, the cadets themselves were subjected to a hard test of another kind. The pressing need of officers for the rapidly expanded army led to successive early graduations of West Point classes. On November 2, 1918, the Corps of Cadets consisted of but one class — the Fourth, with less than six months' service to its credit. West Point had become a mere training camp. Whoever knows the Military Academy realizes that its traditions, its standards of integrity, are the heritage of the Corps, passed on by the older to the junior classes. The wholesale graduation of the upper classes spelled the death of that heritage unless the officer-instructors on duty, with the cooperation of the remaining Fourth Class, could reinculcate the old standards. Their success in restoring what Sylvanus Thayer had first created is not only a tribute to the men concerned but a testament to the soundness of the original ideal.

Once the Corps had been reestablished on its old basis, the Academic Board could concern itself with such modifications as were necessitated by service demands, scientific advance, and general educational development. Modifications have gone on to the present, touching every phase of a cadet's life, as will be noted below—academic, physical, and military. The problems involved have produced additional complications with the increases in the strength of the Corps. Throughout, two rules have been followed —first, that no change should jeopardize the individualized method of instruction peculiar to West Point; secondly, that adoptions should be limited to what had been tested and proven sound. The Military Academy, in brief, is not an educational laboratory.

It is interesting to note that the expansions of the Corps have roughly kept pace with the sporadic increases in the strength of the Army. At the outbreak of the Civil War, the Act of 1843 was still determinative. The full authorized strength of the Corps under that law, and the more important subsequent enactments to the present law, signed June 7, 1935, was set as follows:

1843	220
1900	492
1916	1334
1935	1960

Judging from past experience, the actual total in September of each year under the present law will run little above 1800. Under the present entrance requirements and educational standards, it appears that the average graduating class should number about 400 men.

These expansions in turn have been followed by additions of plant and equipment, always lagging several years behind the existing needs. Two principal periods of construction stand out: 1904-1911 and 1931-1938. With the early completion of the current building program, the Military Academy will enjoy facilities beyond anything it has ever before known. One present lack, soon to be met, is adequate terrain for training purposes and a sufficient supply of pure water. The current land purchase program involves the addition of more than 9000 acres to the Military Reservation.

Whatever the importance of statistics as to man-power and plant, the quality of the graduate—his educational attainments, his physique, soldierly abilities, and personal standards of integrity—these are far more important. Considering these in reverse order, it is enough to say that personal integrity is today on the basis set by Major Thayer in 1817. A remark made to the Corps by a Member of Congress in 1933 illustrates the fact appropriately: "In twenty-two years of service on various committees of the House I have never known a graduate of this institution to make a statement that was

(*Continued on Page 106*)

Launching Heavy Cruiser Vincennes at Fore River Plant

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U. S. Military Academy

(*Continued from page* 104)

not honest as to both fact and purpose."

The professional training of the cadet remains the ground for frequent Service criticism of the Academy. The finished lieutenant of infantry, cavalry, or any other branch is not, and never has been, a proper product of West Point. Its program concerns itself, now as always, with fundamentals. It should be added that tactical training at the Academy does, however, embrace experience with the latest improvements in weapons and technique, necessarily limited by the time available.

Physical training received its greatest single impetus during the early post-World War years when the rule—"Every man an athlete" was adopted. For the cadet of special abilities and superior physique, eighteen inter-collegiate sports today offer ample opportunity for development; all other cadets participate in a broad program of intramural sports. To secure the time for this training, the pre-war schedule of gymnastics, calisthenics, etc., has been reduced. The change has proved wholly beneficial. A vital contributing factor in the improvement of cadets' physique has been the construction program of the Army Athletic Association. It is to be doubted whether the athletic squads of any institution in the country today have athletic facilities superior to those enjoyed by the cadets. Few schools have as good a plant.

Turning to the strictly educational program, a comparison of that of 1863 with the current curriculum discloses two striking contrasts. The curriculum still emphasizes the scientific subjects, recognized at long last by the granting of the degree of Bachelor of Science to the graduate, but there has been at the same time a sharp increase in the so-called "humanities." The study of English, after a stormy career in which it disappeared altogether from the curriculum for ten years (1867-1877), and at other times was sandwiched with such subjects as moral philosophy, geography, ethics, and political law, was finally established on a departmental basis after the World War and given a two-year course. French, after various changes, likewise has two years, Spanish has one. History, two courses, (modern Europe and the Far East) has a year. Economics and Government likewise has one year. Lastly, Law, which in the '60's was one of the many "English" subjects, now has a full year in a separate Department. Noteworthy as these changes are, one finds a greater contrast with the conditions of the older days in the extra-curricular development—the result almost wholly of the cadets' initiative. A debating society, which crosses its swords in a very creditable manner with civilian college opponents, two cadet publications, two dramatic organizations, a glee club, an orchestra, and lastly a lecture organization managed and financed by cadets, bringing lectures, dramatic and musical entertainment to West Point throughout the academic year—all these are earmarks of the cadets' interest in cultural development and their ability to secure it. Lastly, the increased opportunities for short leaves and trips and for social affairs on the post give the cadet of today contacts with the outside world beyond the dreams of his predecessor of even two decades ago. To his great advantage, he has long since ceased to be the military recluse so often pictured by those who are unfamiliar with the Military Academy of today.

Since 1863, West Point has undergone many and profound changes, producing some striking variations in the 1938 product as compared with his earlier forbears. The cadet of today faces far more drastic requirements for entrance to the Academy's portals. Once there he undergoes a sterner program of development — educationally, physically and professionally. He probably has less free time but has more and better opportunities to employ it to his advantage. His academic courses, and indeed his own native curiosity and interest, serve to bring him abreast of modern developments in every line touched by his work, including not only the sciences, but literature, military tactics, the social sciences and public affairs as well.

There remain some graduates who deplore the fact that the cadet of 1938 no longer has to break the ice in his bucket before making his morning toilet, who decry the cadets' present day privileges. They profess to fear a softening of the vital fiber. However, the men in direct contact with the Corps know that the "hardness" of cadet life remains; where it belongs. Whoever sees today's cadet on a practice march or in the heat of an athletic contest recognizes the fact.

Those who are responsible for the development and welfare of the cadet of 1938 recognize fully the fact that he faces, on graduation, a world far more complex than that of his predecessor of 1863. Their first and only concern is to give the country each year a dependable, efficient group of officers. Only the acid test of battle can determine fully how far they have succeeded in their major mission, and for two decades they have been spared that test. Meanwhile they have watched closely the peace-time performance of the young graduate—as a drillmaster, as a student competing with the product of civilian institutions, and in a wide variety of governmental tasks since 1933, many of them utterly foreign to their normal army duties. The full record justifies the conclusion that the cadet of 1938 is at least as well qualified as his predecessor of 1863 to meet the demands placed on him as a citizen, a soldier, and an educated gentleman.

Development of Navy Radio

(*Continued from page* 61)

to the Navy. The Navy Department was to operate coastal radio for the purpose of communicating with Navy ships, to handle Army traffic upon request, to handle weather reports free, and to refrain from competition with commercial stations.

The Board recommended that commercial communications be governed by a regulatory body. It is interesting to note that this Board, with Admiral Bob Evans representing Commerce, acted so wisely that its conclusions are still in effect. The allotment of radio frequencies to the government departments is still handled by the President, acting on the recommendations of the Inter-departmental Board, which is now permanent. The Federal Communications Commission regulates commercial and amateur radio.

Radio then was spark waves, and due to the short range the concept of its use was embodied in a chain of coastal stations only a few hundred miles apart, to communicate with ships at sea.

The predominant company for commercial communications was a subsidiary of the British Marconi which owned a chain of about 47 stations located on the coasts of the United States on both oceans and the Great Lakes.

This company was 90 per cent American stockholders, but a subsidiary of a British Company. When the war came it showed its American spirit by turning over all its stations and all its operating personnel to the Navy.

The second decade of the war decade was marked by the predominant position in the radio world assumed by the Navy. The Navy took over all commercial coastal and transoceanic stations. These latter were foreign, some under German and some under British control. The Navy also had its own system of high power stations, equipped generally with arc sets. Our capital ships were equipped with both spark and arc transmitters and tube receivers. The transmitters were usually tuned to the following wave lengths in meters: 300, 600, 720, 952, 1210, 1500, 2400 and 3020, corresponding in kilocycles from 1000 down to 99. The intra-fleet limited range set was tuned to a single wave length of 126 meters or 2389 kilocycles, giving a range of 15 to 20 miles. The principal characteristic of all this very limited use of radio was interference. No matter what separation there was of the wave lengths used, there would be interference due to the peculiarities of the spark wave train. Only one set in a harbor could operate without intolerable interference.

The Navy undertook the enormous task of equipping about 3,000 ships with radio apparatus and trained the operators to man them.

It established the first all American transoceanic system by uniting into one operating system all the high power stations in the United States, after modernizing their equipment. This great achievement is now looked back upon by many prominent engineers of the industry who participated in it, and also by the Navy, with a great deal of pride.

The Transmitting Stations were located at Tuckerton, N. J.; New Brunswick, N. J.; and Sayville, Long Island. The Receiving Stations were at Bar Harbor, Maine; Belmar, N. J.; and Chatham, Mass. These widely separated stations were all operated from a Remote Control Station at Belmar, N. J.

The messages were communicated to Washington and the various districts by wire.

This system communicated with France (Lyon) and Italy, and in order to get better return signals, the Navy Department put up a 1,000 KW arc set in France and presented it to the French Government.

The various coastal stations were combined into one system for each district. For example, eight coastal stations were all operated by remote control from the single control station at Headquarters in New York.

The Navy Department needed a great deal of equipment for these far-flung activities. The war had brought to fruition the most important discoveries of the marine decade, such as the thermionic high vacuum tube and the use of tubes in receivers and transmitters.

It was essential that these developments be incorporated in the radio equipment which was being purchased, if we were to have the best the state of the art could produce, but, due to patent suits, the production of efficient radio sets was deadlocked.

In the crisis of the patent situation the Navy Department assumed all financial responsibility and declared in effect a moratorium on all patent laws. Manufacturers were directed to produce the best equipment, embodying every known principle and device. This was the Navy's greatest contribution to radio. The radio industry "threw away its crutches, stood erect, and walked for the first time." The result was a single integrated product, the best the art had ever produced.

When the war was over, the industry was beset by many problems. The Navy found itself in possession of 111 shore stations, including all commercial systems. Patent paralysis was threatened with the return of peace, interference in the use of the ether was inherent in so many spark sets mixed with the few arc and alternator sets of the time.

To solve these problems, the Secretary of the Navy, a great believer in government ownership of communications, introduced a bill to retain and operate all communications, government and commercial, by the Navy.

The Navy did not desire to return these high power systems to foreign control. It wanted communications of the United States to be free of foreign influence. The bill for government ownership was however killed in committee.

The technique of high power radio was rapidly changing from spark to Poulsen arc and the Goldschmidt and Alexanderson alternator. During the war the Navy favored the Poulsen arc and bought the stations and all the patents, but the 200 KW Alexanderson alternator proved to be the best for high power, long range work. It was the product of an American company. The Navy Department prevailed upon the General Electric to form the Radio Corporation of America, in order to furnish a market to the Company for its alternators and to keep them out of the hands of a foreign-controlled company. This would prevent American communications being carried on by a foreign-controlled company.

The Navy then prevailed upon Congress to pass laws to Americanize companies operating in America, by requiring the directorate to be American.

With the coming of peace, the old patent paralysis returned to the industry, so the Navy Department called upon the four leading companies to get together and solve the patent situation. On January 5, 1920, it wrote to the companies controlling the principal patents, saying it was "a public necessity that arrangements be made without further delay." This prompted the companies to grant each other the mutual use of all their radio patents. Thus there was incorporated for the first time into an American radio set the Fleming two-element valve patent, the Langmuir-Arnold high vacuum tube, the DeForest three-element tube, the patents of Armstrong, creating continuous waves with vacuum tubes, and the Fessenden heterodyne, and also about 2800 other patents. Each one of the four companies that manufactured radio apparatus licensed the others. The paralyzed industry sprang back on its feet and soon it was evident that spark and arcs were things of the past, and radio entered into a new period of its history, the third decade, a period of the most brilliant accomplishment for the benefit of the country in world history.

It was not evident at first what wealth lay beyond the frontiers of low frequency, and in the broadcast frequency part of the spectrum. The industry had no customers right after the war, so the Navy took over the sponsorship of development of the tube. It practically subsidized tube manufacturers and by its orders encouraged the development of higher power and greater life in tubes. As a result, tubes were stepped up from 5 watts to 50 watts, to 250 watts, and finally to 20 kilowatts.

With power increase tubes became dominant in transmitters, as they were already in receivers, and the industry was ready for the third era—that of broadcasting and that of the sound-motion picture.

It is interesting to note that the Navy had the first broadcasting station at the Naval Air Station Laboratory at Anacostia, where it equipped a studio with piano. This station experimentally broadcast the Marine Band, singers, and speakers. It had the honor of putting the first President of the United States on the air —President Harding's address at the dedication of the Lincoln Memorial.

When the industry took back its stations and started transoceanic communication on a commercial basis in 1920, it was organized for progress and development. This was in keeping with a promise to Congress to solve the interference problem by research rather than by Government ownership. It promised to maintain laboratories and prosecute research.

So, progress and development were incorporated in the organization. At all of its centers of manufacture and operation, the operator, the engineer, and the scientist work side by side so that each day, from contact with operations, proceed the ideas for improvement and new inventions and developments.

The results have been marvelous. The Navy has taken advantage of all new developments and incorporated them in its communication systems afloat and ashore where they apply.

We have the world's greatest commercial communication systems, and the engineers and scientists are in close liaison with the Navy Department.

Now, if necessary, we could utilize 6,000 channels which the radio spectrum is capable of producing for telegraphy, without interference, between 10 kilocycles and 600 megacycles. Instead of only one ship using radio in the harbor at a time, hundreds of ships could do so, without interference.

The industry has made good its promise to solve the problem of interference in the laboratory.

The Navy, along with all others concerned, is ready for the expected advances which the Fourth Decade is about to usher into the composite picture of the ultra-high frequency spectrum.

Army and Communications

(*Continued from page 60*)

If war comes, a large expansion of military communication personnel will be necessary. Many of these men must be technical specialists of high order and I confess that I would be apprehensive of our ability to procure and train such specialists if we did not have the experience of 1917-18 behind us. For that emergency, the Bell Telephone Companies organized 12 of the Signal Corps' 89 battalions, the personnel for three additional battalions, organized for railway communication service, was drawn largely from communication men of the Pennsylvania, Erie and Pere Marquette Railways respectively and that for a similar unit from the railways in the vicinity of Chicago. After a brief period for militarization, these battalions of civilian technicians became excellent Theatre of Operation units. While the independent telephone companies and the commercial telegraph companies were not called upon to organize complete military units from their personnel, many volunteers and selective service men from these systems served in responsible positions in practically all Signal Corps units during the War. We are naturally counting upon such civilian specialists for any future emergency need.

Another contribution of industry is in the training of Regular Army specialists in time of peace. Each year we accept the invitation of the New Jersey Bell Telephone Company to train one or two officers in its Newark school, and of the Automatic Electric Company, and the Teletype Corporation to train an officer and about 15 enlisted specialists in their respective Chicago schools. The graduates of these courses become key men in their respective Signal Corps specialties and as such, they are utilized to spread throughout the service the knowledge and skill which they have acquired from industry.

We have 265 officers and 3400 men in the Regular Army Signal Corps and 140 officers and 1700 men in the Signal Corps of the National Guard. In these two components we have 2 signal battalions, 24 infantry division signal companies and 1 cavalry division signal troop. Troops of the Regular Army Signal Corps operate 170 post telephone systems, 145 radio stations, 3 main and 5 branch depots, 2 research and development laboratories, the Signal Corps School and many other smaller facilities and establishments. The Signal Corps is given the expenditure for the signal equipment and service of the Army of between five and seven million dollars annually. Although in comparison with the vast United States communication industry all this is relatively insignificant, nevertheless, operating as it does with a distinctive mission, and pursuing a high tradition of service, such an organization inevitably makes its influence felt.

The Army furnishes a first-class communication service for its own business, operates a radio system which parallels and supplements the commercial systems of the United States for its own and other governmental needs and—this is of real importance to civilian communications, it extends the commercial communication systems to Alaska. The intercommunity business of this "last frontier" is too small to support a commercial system. Yet, even on the frontier of this modern world, rapid exchange of intelligence is vital to business and is necessary to the contentment of the citizens of the community. Army radio handles the business of the fishing boat, the cannery, the mine, the furrier, the Government, the small business man; it also reports epidemics and asks aid, transmits personal messages and during the long spells between mails, its bulletins, freely posted where all may read, publish epitomized news of the outside world.

Another contribution to industry is through the high standard of Army equipment specifications. Field equipment must be so rugged and reliable as

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The Submarine

(Continued from page 65)

subjected to tests by the French Government; in which a performance very much superior to that of the Bushnell boat was demonstrated. Napoleon, however, unconvinced of the practical utility of the boat, turned it down.

Fulton next attempted to interest the British Admiralty. The verdict of the wise, far-seeing Admiral Lord St. Vincent was:

"Don't look at it and don't touch it. If we take it up, other nations will and it will be the greatest blow to our supremacy at sea that can be imagined."

Over a century later that prophecy came true and that blow delivered by the German submarines brought the British Empire to the verge of a disastrous defeat.

After his rebuff by the British Admiralty, Fulton returned to the United States where with Congressional aid his experimental attack on the brig "Argus" in which Argus was victorious though at the cost of rendering herself immobile by a system of spars and netting extending to the bottom thus effectually preventing the submarine from passing under the ship and bringing her towed torpedo into contact with the hull of the Argus.

That Fulton himself believed that his contribution to the development of the submarine was of even greater importance than his contribution to the development of the steamship is evidenced by a letter written by him in the closing years of his life.

Over one hundred years elapsed before the seed sown by Bushnell and watered by Fulton blossomed in 1898 into the first practicable, mobile, autonomous, modern submersible capable of successfully attacking ships under way. This was the submarine "Holland." The Holland owed its appearance to the development of fairly reliable methods of propulsion for a type of vessel designed to travel both on the surface and under the surface of the sea.

The designers of the experimental boats produced in the interval vainly sought to devise practical means for maintaining and changing depths at will. In the main, their contributions to the art were of value only in so far as they served to explode the generally accepted erroneous idea that when navigating submerged at an even depth, the weight and buoyancy of the vessel must be equal and that it must rise and sink by changing the relation of weight to buoyancy or by means of vertical propellers, meanwhile always maintaining its longitudinal axis in a horizontal plane. Many ingenious and complicated devices and systems were tried and found wanting before the Holland demonstrated the fact that a submarine under way with her buoyancy reduced to a small amount could be driven under water by power from her own propellers and that the depth when submerged could be controlled at will merely by steering the ship up and down on inclined courses as required. As is often the case with engineering problems, the correct solution in this case was arrived at by mechanical means of the utmost simplicity. It consisted of a combination of suitably arranged and proportioned water ballast tanks with horizontal rudders or hydroplanes controlling the longitudinal inclination of the boat.

It has been said, as Mr. J. P. Holland was an Irishman by birth, that he, for less patriotic reasons than Lord St. Vincent, entertained the deep conviction that the development of a practical submarine would be fatal to the supremacy of the British Navy. His lack of engineering training hid from him the enormous difficulties to overcome and this fact combined with his intense convictions carried him to success where others might have accepted defeat through years of abortive experiments, accompanied by discouragement and even ridicule. It is related that in his first interview with his eventual backer, on being asked what funds would be required to prove the case, he stated $100,00. As a matter of fact it was necessary to expend over a million dollars before recognition was gained.

Airplane view of the Electric Boat Company's submersible building plant at Groton, Conn. Left: Mr. Lawrence Y. Spear, former Naval constructor, now vice president of the Electric Boat Company.

In all essential construction and machinery features, the Holland, constructed entirely by private capital for private account and subsequently purchased by the United States Government, was the original prototype of the modern submersible; moreover, her construction would have been impossible except for the development by private industry of the internal combustion engine, the electric motor, the air compressor, the storage battery, the automobile torpedo and the materials required for the hull, machinery and equipment.

It is a very far cry from the tiny Holland, a harbor defense craft, blind and deaf when submerged, of only 67 tons displacement, propelled on the surface by a gasoline engine of 50 horsepower and when submerged by an electric motor of the same power, with a very small radius of action and armed with a single torpedo tube; to the large seagoing, heavily armed fleet submarine of today, with six inch guns and from 6 to 8 torpedo tubes propelled by Diesel engines of many thousand horsepower, at speeds up to 22 knots, capable of cruising some 15,000 nautical miles on one supply of fuel, equipped with long range radio apparatus, highly developed safety and rescue features and highly efficient submarine eyes and ears.

This enormous development, involving the construction for the United States Navy alone of twenty-five different designs, necessarily has been dependent not only on actual experience at sea with each successive type, but also on the general progress made in the arts and sciences of naval architecture and engineering. Private industry has been responsible for over 80% of the different United States designs and has contributed very largely to the enormous advances made in the designs, not only of the hulls, but also of the machinery and equipment.

With very few exceptions, all of the essential elements of the modern submersibles, machinery and equipment, can be traced back to those which private industry originally developed for commercial use for instance, the storage battery, air compressor, the electric motor, the internal combustion engine, radio apparatus and the gyro compass. Private industry, under the guidance and with the assistance of the navy, has also been largely responsible for the continuous refinement in the design of such machinery and apparati.

On the other side of the ledger, it is to be noted that the improvements in machinery and equipment due to submarine demands have been widely applied in the commercial field. Noteworthy in this respect is the Diesel engine. While this type of engine was first produced in the United States for commercial purposes in stationary power plants, the first marine Diesel appeared in 1912 in the "E" and "F" submersibles designed and constructed by a private firm, which subsequently introduced the engine into the marine commercial field, where it has since been very widely and usefully applied.

With respect to this type of engine, however, the story of the inter-dependence of private industry and the national defense does not stop with the introduction of the marine Diesel engine into the commercial field. Some five or six years ago, when Diesel engine designers and manufacturers were seriously engaged in the development of a compact, light weight engine suitable for passenger train locomotives, the need arose in the navy, mainly for submarine propulsion, for an engine of similar characteristics. The Bureau of Engineering persuaded a number of manufacturers to undertake the construction of experimental engines, financed in part by the government and in part by the manufacturers. This experimental program, which resulted in great advances in the art, contributed in some degree to the successful solution of many problems including that of the locomotive engine and hence to the latest railway wonder, viz: the fast Diesel-drawn, stream-lined passenger train of today.

Outside of the elements which owe their origin to commercial needs, the most important contributions by private industry are the submarine eye or periscope, and the submarine ear or under-water sound apparatus.

Operation

A submarine must submerge immediately upon sighting a strange ship. If it does not, and the ship turns out to be an enemy vessel, the submarine will be denied the advantage of surprise. A submarine submerged can not overtake even the slowest surface vessel unless the latter steers toward the submarine. A high submerged speed for a limited time is a fundamental tactical characteristic for successful attack.

Submerged radius is needed to enable an approach from a distance, remaining submerged until the greatest amount of damage has been accomplished, and then escape submerged from its pursuers. In thick weather a submarine will desire to run submerged for hours and yet have sufficient battery capacity remaining for a spurt attack on an enemy ship.

Surface speed is more of a strategical factor than a tactical one. On information from scouts a submarine will use high surface speed to place itself in the path of an enemy. In such an attack submerged speed becomes important.

Submarine size and speeds have been questions that appear almost to baffle solution. The answers necessarily lie in the conception of how submarines are to be used in war. There are many plans carefully studied by those who will be responsible for successful war operations, such as: the concentration at points threatened; scattering them along our expansive littoral; lying in wait near threatened points until an enemy stumbles upon them; or to give the submarine better seagoing qualities, which means size and long radius of action, in order to enable it to travel to considerable distances in search of enemies. The construction of types for each of these uses has been advocated, which would probably mean building in proper proportions a coastal type and the cruiser or fleet submarine type. A compromise points to a submarine large enough to perform a maximum purpose, yet not too large as to be unhandy in submerged operations. In this type all the lesser services will be possible. A vessel of about 1400 tons seems to fulfill the role of a maximum purpose submarine. Such vessels will be most habitable for their crews, have greater space for overhaul of the intricate machinery and equipment and be able to carry a larger number of torpedoes and more ammunition for the guns. They will be able to remain away from their base for long periods without refueling and restocking supplies.

Two private firms, one now extinct, have built practically all of the submarines for our navy, outside of those few built at navy yards. The designs were furnished by the builders and approved by the Bureaus of the Navy Department concerned. Characteristics were laid down by the Navy Department and incorporated in the specifications and plans.

For reasons of profitable business, it was but natural that the interest of the builders would be towards standardization in design and size. The Navy Department and the submarine personnel desired that each successive class should be a distinct improvement over the earlier class. The common sense solution was that of laying down an experimental vessel embodying all recent ideas and improvements and rushing this unit to completion before building similar ships that all might turn out failures.

In the days of submarine infancy, until the war proved the submarine's worth, the Navy Department was inclined to give the submarine arm of the navy little consideration. It was believed an expensive luxury in the eyes of many of the older and conservative officers. At best the vessels of those days were oily, greasy, unkempt conglomerations of engines and equipment most intricate and confusing

(Continued on page 110)

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DOCKING AND REPAIRING

The Submarine

(*Continued from page* 108)

to grasp intelligently and like the air service its personnel was supposed to be temperamental and at times almost mutinous. The attitude of some of the Bureaus seemed, to those who were conscientiously struggling against odds to bring out submarine efficiency, to be expressed in that famous saying: "The best way to exterminate vipers is in their nests." However, despite all vicissitudes the development of the submarine went on apace and today all these sad tribulations are forgotten when we gaze in pride at our marvelous submarine cruisers, equal to the best if not so numerous as they should be to take care of our difficult strategical situation and the nation's security.

At first, the submarine personnel, both officers and men, were detailed to duty in submarines in the same way as to surface warships, without any regard to previous submarine training or fitness for this specialized work. In consequence there were many occasions when new vessels went into commission with a large part of their complement composed of green men. The result was that a long time elapsed before a submarine captain was willing to submerge his craft in the deep water of the ocean, preferring to stick to a safe depth, 200 feet, for which the hull had been tested.

In recognition of this faulty condition, a submarine base and school finally was established at the old naval station at New London, Conn., for the express purpose of training submarine personnel. Today the personnel for the new submarines and for general submarine service continuously are being turned out from this naval college and manual school to take their places in the submarine flotillas.

Submarine life probably is more exacting than other walks in the naval service. The ships relative to the bigger surface vessels are small and cluttered up with machinery and equipment. There is little space for overhaul which nevertheless must go on conscientiously and continuously. The life tends to break down the apparently traditional formal barrier between officers and men, and a wholesome comradeship, without a hint of familiarity, takes its place. A common peril, the vital need of expert knowledge, a highly responsible leadership, intelligent obedience and quick and unerring right action in time, binds the officers and men together as a band of brothers in a hazardous service, creating an esprit de corps most ingratiating and necessary for efficiency in the operation of this particular type of warship. The submarine school has proved its worth as a most necessary starting point for life on board a submarine. Unqualified material can be early weeded out before being sent to vessels engaged in nerve racking maneuvers with the fleet, where a single stupid mistake might spell disaster.

When the school was first started and like all innovations came in for considerable "rigging," student officers were detailed to relieve the regular crew of a submarine and take the vessel out for diving work. The experienced crew of all ratings was left behind. One day a submarine so manned was about to shove off from the dock to go outside the harbor and submerge. Just before the last line was let go, one of the old crew came running back and without a word hurried down the ladder to the deck below. In a few minutes he returned on deck bound for shore with a parcel hugged under his arm. One of the student officer crew innocently enquired what it was all about. The reply was none too complimentary: "I left behind my new shoes which I bought; I don't want to lose them, they cost me all of six dollars." The old hand was not sure the submarine would be returning at all.

Living conditions on the earlier small submarines were none too comfortable and to ameliorate this situation when in port large and roomy submarine tenders, fitted as workshops and "hotels," were attached to the flotillas, forming with them units under the submarine commander. Owing to the excellent living accommodations provided in the modern large fleet submarine, the crews can live aboard in comfort for very extended periods so that "hotels" service is not essential for this type.

To show how important expertness and almost infallibility in operation should be considered: A division of submarines of the K-class had made a surface run of about 600 miles and had been told that at the end of the run all vessels would be expected to submerge on signal, a stationary dive, a difficult one to make. At that time fuel tanks were not compensating and the weights had to be calculated continuously and fuel pumped about to maintain trim for diving or submerging. Fortunately the location selected for this submerging was where the bottom was not too far distant. This occurred before the school had been established and these submarines had been in commission only a few months and officers and crew were inexperienced. When the ballast tanks were flooded one of the submarines at once took an alarming inclination down by the head and before the excited captain could act to correct the condition the submarine was on the bottom at one hundred feet. If the depth had been a thousand fathoms the submarine would never have been heard from again.

It has been claimed and almost constantly emphasized that inherent in submarine war operations there is always the blackest cruelty and marked inhumanity. In a submarine's attack with torpedoes on a passenger steamer, like the "Lusitania," the claim may have some justification; yet war of today is no longer a war between professional soldiers and sailors. It is what General Ludendorff calls, "The Total War," a war of nations where there are no non-combatants. A passenger ship may be used as a troop ship if it is spared, a distinct military asset to the enemy. A submarine can not give warning. If it does it defeats itself. Surprise is basic for all armed forces by land and sea and not inherent alone in the submarine.

The submarine's most important weapon is the torpedo; the same torpedo used by other types of warships, hence the same destructive effect. The torpedo has been demonstrated as more merciful than the gun. Death and physical injury from the explosion of a torpedo usually is limited to but a few men in the compartment where the brunt of the assault takes place. At worst the ship sinks slowly, oftener than not, permitting the lowering of boats and rescuing the survivors. Compare, at any rate, this peaceful death to a ship hammered to pieces and sunk by gunfire as was the "Blucher" in the battle of the Dogger Bank or the "Queen Mary" and the "Indefatigable" in the battle of Jutland.

The importance to the country of private industry to national defense, not only in war but in peace, can not be too strongly emphasized. In such industrial plants as those that are capable of designing and constructing the most modern submarines and other types of warships, there are thousands of engineers and scientists in shops, drafting rooms and laboratories continuously engaged in research and development, the results of which are being applied to national defense. It is quite impossible for the government in time of peace to command and pay the bill for all this talent.

While due to special conditions private industry has contributed more to the development and perfection of submersibles than it has to any other weapon or instrument of national defense, unless it be the airplane, yet its contribution has been and always will be vitally necessary all along the line for all types of warships and weapons. In time of war, the production of ships and other instruments of national defense must be suddenly and enormously expanded and unless private industry is entrusted with a reasonable share of peace-time production, the necessary rapid expansion required in war time would be wholly impossible.

The inevitable consequence of the divorce of private industry from the national defense would be most probably the loss of the next serious war in which the United States might be forced to enter.

It would be quite impossible to name all those officers of the navy and civilians who have materially contributed to the perfection of our submarines and their organizations. First and foremost, Mr. Lawrence Spear, the well-known submarine designer and builder has given his life efforts to building up our present fine submarine service. Thoroughly convinced of their importance in our war fleet, he has worked, not only to change adverse sentiment against the type, but through his scientific skill has produced submarines of which any nation would be proud. Service opinion for some years in general was adverse to the adoption of the type and the powers that were in the Department feared that if too much encouragement were given, Congress might, under pressure of public sentiment in favor of an apparently cheap means of defense, favor in its appropriations submarines against the other types of warships which the Department rightly considered to be essential. Mr. Spear labored diligently to counteract this adverse opinion and in the end succeeded. Mr. Spear received great encouragement in his campaign against the doubters from Admirals Dewey, Hitchburn and Kimbill, all advocates of the type.

It is worthy of note that the acquisition of the A-class (Adder and Moccasin) was due to the independent action of Congress against the opposition of the Navy Department, and that when these boats were delivered a single officer, rank of ensign, was assigned to command both boats and they were sequestered in isolated waters.

Looking back we cannot blame the officers of the Navy. It was but a natural reaction of a conservative trend found in all navies. Remember when steam became practical the British Admiralty resisted strongly the advent of the steam ship of the line. The old sailing ship of the line that won for Nelson the great battle of Trafalgar was good enough for those British Admirals who were Nelson's captains in that battle.

In addition to Mr. Spear another who contributed to submarine design and construction was Mr. Simon Lake. It was not Mr. Lake's fault, nor his company's, that these, the inventor's ideas, did not succeed in producing as successful a submarine as did the Electric Boat Company, after the designs of Holland. Mr. Lake in creating competition and in making the public submarine conscious served well his country. Others in private life who contributed to the evolution of the modern submarine in this country are: Mr. H. E. Grieshaker in design and Captain F. T. Cable in his early work in developing practical details in operation.

No account of the successful development of our submarine service would be complete without the mention of the part played by the late Vice-Admiral A. W. Grant, U. S. Navy.

In 1915, as a rear admiral, he was the first flag officer to command that service and coordinate submarine operations with strategical and tactical requirements of the United States for these warships. He brought to the young struggling submarine service an added prestige because of his rank and wide naval experience. He was a strong advocate for the larger types of submarines and a man of both great mental and physical power.

With Mr. Lawrence Spear, he might be said to divide honors for the progressive evolution of the large submarine types in our Navy. Admiral Grant was the founder of our submarine base and school at New London, Conn., and above all other naval men might be said to be the father of our present efficient submarine personnel efficiency.

The Army of the 60's

(*Continued from page* 56)

a skirmish line of one company to cover the regimental front. The battery was generally well on the front line. Our muzzle loading rifles with bullets two-thirds of an inch thick, required at least two minutes between shots, full commands being "prepare to load, handle cartridge, tear cartridge, change cartridge, draw rammer, ram cartridge, return rammer, prime, ready, aim, fire, or 'fire at will.'" Our muzzle loaders had an extreme range of 600 yards, the 12 pounder Napoleon of the battery a limit of one mile. Throughout the army there were a few regiments armed with breech loading Spencer carbines.

On the celebrated campaign of Sherman from Chattanooga to Atlanta, May to September, 1864, inclusive, our four army wagons to each company, as in earlier days, were reduced to one for each regiment. Each man carried on his person 40 rounds of ammunition in a heavy leather cartridge box, one-half a shelter tent, one blanket, a change of underwear, three days' rations of hard bread, bacon, coffee and sugar, a combination frying pan and plate, knife and fork and spoon. Messing was largely individual. Nothing else in the four months as I saw them. Rations were replenished from a brigade train in the rear. This kept the front line a clean fighting unit. Scurvy appeared in absence of anti-scorbutics, teeth loosened in the gums, flesh was lifeless. At first a few beef cattle marched with us, soon to become skinny and called "dried beef on the hoof." Our advance against General Joe Johnson and, later, John B. Hood (from Peachtree Creek) embraced worthwhile battles and heavy skirmishes every few days. Our line of communications, Nashville to Atlanta, some 300 miles did not escape its share while defending our supplies along the line from raids by General Joe Wheeler and N. B. Forest.

In late October, as Sherman marched to the sea, our regular brigade became a part of General Geo. H. Thomas' command, all north to Nashville watching General Hood. The world knows what happened to him at Franklin and Nashville, which with Sherman at Savannah and subsequent junction with Grant's Eastern Army, the war between the States soon ended, and duty called my regiment to the Northwest Indian Country to relieve a volunteer brigade under Brig. Gen. Patrick E. Connor whose duty had been to keep the Indian allegiance on the Union side. We spent the first winter of 1865 at old Fort Kearney, 200 miles west of Omaha on the Platte River, crowding eight companies into a four company post. In May, 1866, we marched to Fort Laramie 100 miles north of Cheyenne as the initial point of a proposed route for emigrants moving towards the Gallitan Valley, Montana. The Indians opposed, giving us a release from a Civil War by a scalping season. Our herds of mules were stolen, Brevet Col. Wm. J. Fetterman, Lieutenant Brown and Grummond with 83 enlisted men were butchered and mutilated by 3000 Sioux Indians under Red Cloud.

Our soldiers still had the muzzle loaders. In August following, Brevet Major J. W. Powell of my regiment with breech loaders and 50 men stood off these same Indians at the Wagon Box fight with a loss of Lieutenant Jenness and half a dozen men.

After nine years more of Indian turbulence, including the massacre of Custer near the same place and the killing of Sitting Bull, the Indians of our Northwest Country were gradually placed on reservations.

And now, in concluding my rambling high lights and by lines of old day army events, may I submit a few thoughts on the importance of army preparedness as a preserver of peace. Our people do not approve of a large standing army in time of peace, nor its burden of taxation, but the fact remains that since the founding of our Nation in 1783 we have had a war every 26 years on an average, with heavy unnecessary loss of life and treasure, much of which could have been avoided.

Present-day laws governing our preparatory measures are excellent so far as they go, the R. O. T. C., the C. M. T. C. etc., but they do not furnish the fighting man-force. The States should supply this in loyal support of a government that assures them life, liberty and happiness. My plea is for the ARMY AND NAVY JOURNAL's continuance as our guide, counselor and friend in support of preparedness.

Army and Communications

(*Continued from page* 107)

to demand specifications all but impossible in their perfection. In submitting these specifications to industry for the manufacture of Army equipment, we give industry a real mark to shoot at, an ideal which calls for the highest attainable engineering and productive skill. In attaining these standards for military equipment, industry must inevitably improve the general level of its commercial product.

A final contribution, but one which we make with reluctance, is the feeding into industry each year of hundreds of men whom we have received as young recruits fresh from grammar or high school and whom our Army schools and practical training have made competent technical communication specialists. To cite but one example, many enlisted operators drawing salaries of from $50 to $84, who have been trained by the Army to handle high-speed radio transmission and reception, have left the Army and have been given positions of the same kind by commercial companies with initial salaries of $160 per month. We do not hold against industry this exodus of key men because we know that industry does not proselyte them, nor do we hold it against the men, for we recognize that every man in time of peace feels at liberty to sell his services where they will fetch the most. Recent Congresses have been rather generous to us in providing increased grades and ratings for specialists. But a scale of increases which would give us parity with industry would seem unreasonable, and, so far as I know, such increases have never been seriously proposed. Our one consolation in losing these trained men is the belief that when an emergency breaks, they will remember the Signal Corps motto, "Pro Patria Vigilans" and will rush back into uniform. We will need everyone of them.

In conclusion let me say that Army communications do considerable for industry, industry does a great deal for Army communications and I am happy to say that the thousand daily contacts between the Army and industry are conducted almost without exception in a spirit of the greatest cooperation and cordiality. The Army and the communication industry are friends who understand each other.

Trends In Radio

(*Continued from page* 61)

been made clear by these tests.

We are advancing simultaneously along three broad fronts of television development: (1) research and engineering, which must point the road to steady transmission and reception, and the development of suitable receiving sets for the home within the price range of the public; (2) program production tests to develop a television service of genuine interest and value; (3) economic studies to create a sound business basis that will support so costly an enterprise as television programs and networks are bound to be. On fronts 1 and 2 our work has made definite progress and has brought us nearer the desired goal. But on front 3—the search for a sound business basis upon which a great new public service and an important new industry may be created—little progress has as yet been made at home or abroad.

Our present facilities for distribution of sound broadcasting cover the vast area of the United States and serve its 130,000,000 people. Similar coverage for television programs, in the present state of the television art, would require a multiplicity of transmitters, and network interconnection by wire or radio. Such facilities are still to be developed. It is to be expected that developments along these lines will come in time, but the process will necessarily be gradual and call for a large financial investment.

The chief distinction between television in foreign countries and in our own is the distinction between experimental public services undertaken abroad under government subsidy, and commercial development undertaken here by the free initiative, enterprise, and capital of those who have pioneered the art in the United States.

Meanwhile, the established services of radio in the field of communications and broadcasting are more efficient in operation, more comprehensive in scope, and enjoy a higher degree of public confidence and good-will than ever before. Television and facsimile will supplement and not supplant these services.

The approaching "new era" of radio will represent, not a revolution, but the conquest and annexation of another piece of rich new territory in the natural kingdom. It should prove a most significant addition to the list of contributions made by the pioneers of science and industry to human welfare.

In this effort to wrest the secrets of space and translate them into useful services for mankind, there are pioneers and hard workers in the service of our Government as well as in private laboratories and industry. Our Navy and our Army have made and are continuing to make substantial contributions to radio and its many services.

The Radio Corporation of America which was created nineteen years ago as a result of our Government's inspiration, has always regarded it a privilege to cooperate with the various branches of the government service concerned with the development and use of electricity's modern means of communication, information, and entertainment, made possible in this Radio Age.

The Adjutant General's Dept.

(*Continued from page* 66)

personnel records of the Civil War were concerned. Up to that time the military records of the soldiers taking part in the conflict were filed in the office of The Adjutant General, while the medical records of the same soldiers were in the custody of the Surgeon General. In order to overcome the manifest difficulties of such a dispersion of related documents, there was established a separate division of the War Department to be known as the Record and Pension Division, wherein all records pertaining to veteran personnel of the late war would be brought together, classified, collated, and properly indexed for ready reference. Into the new division, which had its own chief, went one division of the Surgeon General's office and thirteen of the Adjutant General's Department, as well as a small contingent of clerks from the office of the Paymaster General of the Army.

In 1895 The Adjutant General was relieved of the duty of distribution of publications pertaining to the several bureaus of the department and also the care of the military prison at Fort Leavenworth. The duty of publication distribution was assigned to the Chief Signal Officer, who was in charge of the War Department Library, while the prison was turned over to the Department of Justice. Both the publications and the prison have since been returned to the control of The Adjutant General.

In this brief article it will be impossible to discuss in any detail the increased duties devolving upon the Adjutant General's Department as a result of the outbreak of the Spanish-American War. It must suffice to say that the necessary adaptations were made more easily as a result of the reorganizations effected during and following the Civil War.

Passing on to 1904, in that year the Adjutant General's Department, as such, went out of existence in name only, after having functioned continuously since 1813, when it was first specifically created by name. The department functioned as formerly, only under a different designation. Under this change the Adjutant General's Department, and all the officers thereof, except The Adjutant General, were consolidated with the Record and Pension Office, into a separate corps known as the Military Secretary's Department of the Army, while The Adjutant General's Office, proper, and the Record and Pension Office were known as the Military Secretary's Office. This arrangement continued until 1907, at which time the Adjutant General's Department was reestablished. It has functioned as such since without interruption.

When in 1912 an Army Reserve was authorized, the administration of that new component of the military establishment was placed under the care of The Adjutant General as part of his regular recruitment program.

Directions were issued the next year under which The Adjutant General was to collect and classify, with a view to publication, the scattered military records of the Revolutionary War, including those of all troops acting under state authority.

A system of regimental recruiting was tried out in 1914, but with unsatisfactory results, so that The Adjutant General

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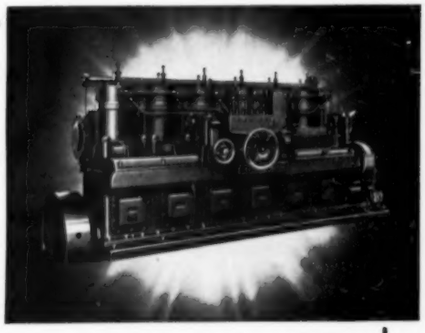

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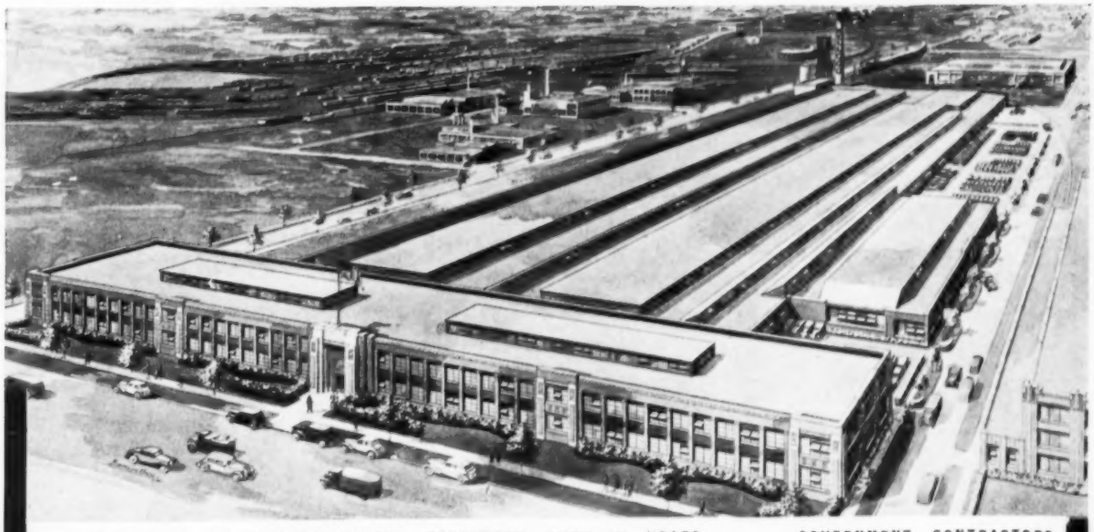

MANUFACTURERS OF COMMUNICATIONS EQUIPMENT OVER 40 YEARS . . . GOVERNMENT CONTRACTORS

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was speedily directed to take control again.

The year 1916 proved a busy one for the department. Fortunately, in view of what so soon followed, the National Defense Act of that year increased the officer strength of the department to fifty-one, headed by a brigadier general, The Adjutant General. The calling into Federal service of the National Guard during the summer, and its subsequent administration, laid a heavy burden upon even the enlarged department. At the same time routine work was increased when the distribution of public documents to the Army was returned to the Adjutant General's Department from the War College Division.

No sooner in 1917 had the National Guard troops been mustered out of Federal service than it was necessary to recall them for participation in the World War.

It would be patently impossible, within the short space allotted this article, to give even an outline of the development and growth of the department at this stage of our history. It can only be mentioned in passing that among the outstanding innovations necessitated by a war in which the theatre of operations was so far removed from the seat of the Government was the inauguration and building up overseas of a supplemental Adjutant General's Department in the A. E. F., which in its ramifications ultimately eclipsed anything that had hitherto been known in Washington. The department today, of course, has been enlarged to absorb the records collected and preserved by the overseas branch during 1917-1919. Thousands of packing cases of records, running into millions of documents, were brought back by the returning troops. The work of assorting, classifying, and preparing this material for reference and publication is still going forward. Added to the actual war records, in 1919 the records of Selective Service Boards from all over the country began to arrive in Washington. These records involved about 24,000,000 men — all who were registered during the emergency.

In 1920 the personnel of the department was increased to a permanent strength of 117 officers, headed by The Adjutant General, with rank of major general. There was also added the office of The Assistant The Adjutant General, carrying the rank of brigadier general. The Assistant The Adjutant General, in addition to his other duties, is charged with the administration of the Personnel Bureau, which has charge of recruiting as well as other personnel matters.

Among the major tasks accomplished by the Adjutant General's Department since the close of the World War may be cited the handling of the applications for Adjusted Service Certificates in 1924-1925. Before the Director of the Veterans Bureau could issue certificates or make any payments, the service claimed by veterans had to be verified by The Adjutant General's office. So efficiently and smoothly did the work proceed that by January 1, 1925, when the law directed that issuance of certificates begin, every application that had been received in The Adjutant General's office prior to that date had been acted upon and duly authenticated certificates turned over to the Director of the Veterans Bureau. The latter, in a letter to The Adjutant General, said:

"This is one of the finest examples I have had brought to my attention as to what can be accomplished by co-operation and co-ordination."

During the past thirteen years the department has been engaged in work involving personnel administration and procurement, publication and distribution of regulations and other documents, conducting the correspondence between the War Department and the Army, and the continued assembling and publication of historical records. At the present moment machinery is being put into shape to administer the recently authorized Regular Army Reserve, as a result of which it is hoped materially to increase the number immediately available for service with the Regular Army should an emergency requiring the use of armed force be declared by the President.

The U. S. Marine Corps in the World War

(*Continued from page* 63)

across the Paris-Chateau Thierry Road north of the Marne in a front of about eighteen Kilometers which was subsequently shortened, and its troops rearranged so that the Fourth Brigade held the left sector of the line.

It was in front of this position that the attacks of the Marines on Hill 142, Bouresche and Belleau Woods were made on June 6th. The battle continued for almost a month. It was a contest of skill against skill, will against will, valor against valor and Esprit de Corps against Esprit de Corps. The U. S. Marines won the contest and Belleau Woods was theirs at a cost of over 5,000 killed and wounded Marines. Colonel Catlin the commander of the Sixth Marines was among the seriously wounded and Major Cole, the commandant of the Sixth Machine Gun Battalion was among the killed. Colonel Harry Lee and Major Waller, respectively, were directed to take over the command of Colonel Catlin's Regiment and Major Cole's Batalion. On July 9th, the Second Division was relieved by the 26th, and withdrew to a position in reserve.

After Ludendorf launched his last offensive on July 15, which was unsuccessful, Marshal Foch decided to assume the offensive by a counter attack on the western flank of the Marne Salient southwest of Soissons. The Second Division was transported at night in trucks to a position in rear of the point selected for attack and took shelter in the woods during the day light hours. The next night (July 17-18,) the troops marched under cover of the darkness through Villers Cotterets Forest. Suddenly at 4:35 A.M., a terrific artillery fire began and in a few minutes the infantry regiments and the Fifth Marines moved forward in the surprise attack made by the first and Second American Divisions and a French Division which was a brilliant success.

The next morning, the Sixth Marines which had been the Corps reserve continued the attack.

During the two days' fighting, the Second Division captured eighty cannon and more than 3,000 prisoners. Immediately after the attack the German army in the Marne sector began its retreat.

General Harbord had relieved General Bundy as the Division Commander on July 15, and he remained in command of the Division during the battle and until July 28. Colonel Neville commanded the Fourth Brigade and Colonel Feland the 5th Marines temporarily. On July 25th Brigadier General John A. Lejeune, U. S. M. C. who had been in command of the 64th Brigade of the 32nd Division, received orders to command the Fourth Brigade of Marines and reported for duty in the evening of that day at Nanteuil-le-Haudoin. On July 28th, General Harbord was detached from duty as Division Commander in order to take charge of the A. E. F. Service of Supply, a duty of vital importance. As Senior Brigadier General in the Second Division, General Lejeune automatically succeeded General Harbord as Division Commander and General Neville resumed command of the 4th Brigade. General Lejeune's temporary status as Division Commander, Colonel Neville's as Brigade Commander and Colonel Feland's as Regimental Commander became permanent a few days later when a cablegram was received by General Pershing from the War Department containing the information that Brigadier General Lejeune had been appointed a Major General and Colonel Neville a Brigadier General by President Wilson.

General Lejeune's first duty as Division Commander was to move the Division by rail to Nancy. A few days after its arrival there, it relieved a French Division in the Marbache Sector astride the Marne River and within sight of Metz. After ten days in this quiet sector in which except for minor raids, no events of importance occurred, the 78th American Division relieved the Second Division and it marched to the training Area of Colombey-les-Belles.

There the Division received several thousand replacements and took a strenuous course of training in preparation for the battle of St. Mihiel. Some days before the battle was expected to take place, the Division marched to the front and after a few days in reserve, it took position in the front lines north of Toul as the left Division of the First Corps consisting of the 82nd, 90th, 5th and 2nd Divisions, and on its left, was the 4th corps consisting of the 89th, 42nd, and 1st Divisions. The stated 4th Corps had as their mission a break through the southern face of the St. Mihiel salient by means of a great wheel turning movement on the right Division as a pivot until its left came into contact with the 5th Corps which had as its mission the attack on the western face of the salient.

The special mission of the Second Division was the capture of Thiacourt and the line Jaulny-Xammes. A four hour artillery bombardment preceded the infantry attack which commenced at 5:00 A. M. on September 12. The Second Division attack was entirely successful, as the attacking force moved forward on schedule time, taking Thiacourt and the line specified. The Division captured 120 cannon and 3300 prisoners. It was relieved in the night of September 15th by the 78th Division and marched by easy stages to Toul where it arrived on September 21st.

On September 25th, it began to entrain for a move to an area near Chalonssur-Marne where the Division passed under the control and the orders of Marshal Petain, the Commander-in-Chief of the French Armies. The last of the 56 trains containing the rear echelon of the Second Division arrived at its destination on September 28th, and within a few hours orders were received for the Division to move to the Louvain-Snippes area where it would be a reserve of the Fourth French Army commanded by General Gourand.

This Army was engaged in fighting a bitter battle in conjunction with the battle of Meuse-Argonne. The movement of the Second Division to the front commenced on September 29th, and was completed the following night when orders were immediately issued for it to enter the front lines, the night of October 1-2, a little to the north of Somme-Py, and to attack on the morning of October 3rd. The attack was made in conjunction with the French army after five minutes preparatory artillery fire. The Division executed a converging attack on Blanc-Ment Ridge, a formidable position. The 3rd Brigade, having marched at night to the adjoining sector on the right, advanced obliquely to the right half of the objective, and the 4th brigade being in the front lines advanced by column of regiments to the left half of the objective.

The attack was altogether successful but during the next week, a constant bloody battle took place as the enemy concentrated a large force in the Second Division front and flanks. However, the Division gradually advanced and the Germans withdrawing their forces from the vicinity of Rheims prepared to retreat. This they did to the north bank of the Aisne River on the day that the Second Division was relieved by the 36th Division.

The following letter written by General Gourand to Marshal Petain is quoted: "Because of the brilliant part played by this 'Grand Unit' in the offensive of the Fourth Army during the Autumn of 1918 I propose the Second Division for a citation in 'The Order of the Army' upon the following specific grounds:

"'The Second Infantry Division, United States, brilliantly commanded by General Lejeune, played a glorious part in the operations of the Fourth French Army in October, 1918. On the 3rd of October this Division moved forward and seized in a single assault the strongly entrenched German positions between the Branc Ment Ridge and Mediah Ferme, and again pressing forward to the outskirts of St. Etienne a Arnes, it made in the course of the day an advance of 6 Kilometers.

"'It captured several thousand prisoners, many cannon and machine guns and a large quantity of other military material. This attack combined with that of the French Divisions on its left and right resulted in the evacuation of the positions on both sides of the River Snippe and his withdrawal from the Massif de Notre Dames des Champs'."

On the 22nd of October, the Second Division marched to the East to rejoin the American Army on the Meuse-Argonne battlefield so as to be in readiness to form the point of the wedge in the great attack which General Hunter Liggett had planned for the first American Army to make on November 1st.

On arrival, the Division occupied reserve positions until the night of October 30-31, when it relieved the Forty-second Division. On the morning of November 1st, the attack was preceded by two hours artillery fire in which three artillery brigades participated in support of the Second Division. The Marines and the Infantry moved forward at 5:30 A. M. and took by assault the Bois de Hajors and the towns of Landres et St. George's, St. George's Landreville, Chenery, Bayonville and the Heights of Barricourt.

By the evening of November 3rd, the Division had advanced to the edge of the Forest of Belval, and after dark the Infantry Regiments and a battalion of Marines advanced through the enemy's lines by a single road until they, at 11 P. M. emerged from the woods near Beaumont fully six kilometers beyond the lines of the Divisions on its right and left. The night of November 4th the advanced detachments of the Infantry regiments pushed forward to the Meuse River which they held until supported by other divisions.

On the last night of the war, the Second Engineers assisted by the Ninth Infantry threw two foot bridges across the Meuse and the First and Second Battalions of the Fifth Marines followed by a battalion of the 89th Division crossed resolutely and unflinchingly to the east bank of the Meuse in a hail of bullets and at dawn the First Battalion of the Ninth Infantry crossed to the East bank in support of the advanced force.

In the last battle of the war as in all others in which the Second Division participated it enforced its will on the enemy.

The fighting was over at 11 A. M. on November 11, and every one turned their thoughts to preparations for the march to the Rhine. On arrival there, after an arduous march, the Second Division took station in the garrison of the Coblenz bridge head on the East bank of the river and there it remained until July 15, 1919, when it proceeded by rail to Brest and thence to home.

On August 8th, the union of the Army, Marine Corps and Navy in the Second Division passed into glorious history as after the Division parade on Fifth Avenue, New York City, the Marine Corps units at once entrained for Quantico, and the Army units for the most part entrained for Texas where an Army Brigade was substituted for the Marine Brigade.

During its participation in the world War, the Second Division had about 25,000 casualties and captured about 330 cannon and about 15,000 prisoners. Its war record was unsurpassed by any other American Division.

Swimming claims many hours of a Michigan vacation. The clean, cool water of 5000 inland lakes and 4 Great Lakes is ideal for this sport.

Old Fort Mackinac, on lovely Mackinac Island, is the oldest occupied U.S. fort. Each summer, in August, U.S. Army Week is celebrated here. Mackinac Island itself is a beauty spot of national renown, offering all conveniences in a setting ages old.

© DETROIT NEWS AIRPHOTO

Air view of Presque Isle, on the East shore of Michigan. Note the many inland lakes in the distance. This is typical of the state, which is dotted with more than 5000 attractive bodies of clear blue water.

Typical Michigan highway (*top*). A broad safe road in the Upper Peninsula skirts Lake Michigan.

Dusk on the water is cool, calm, restful. This is sunset over one of Michigan's lovely inland lakes.

Taquamenon River rushes through the forests of Michigan's Upper Peninsula to Lake Superior. The Falls of the Taquamenon (photograph shows Lower Falls) are nationally famed for their scenic grandeur.

Families on vacation particularly enjoy Michigan's variety of vacation fun. Broad, gently sloping beaches make bathing and beach fun safe for youngsters who grow healthy in Michigan's bright sunlight.

Fish are plentiful in Michigan's lakes and streams. Trout, bass, pike, perch, big mackinaws and muskellunge provide angler's sport.

Golfers will find plenty of courses to test their games in Michigan—many in picturesque settings with lakes and deep woods nearby.

Sailing and all water sports find their widest scope in Michigan's lakes and rivers—greatest inland water playground of the world.

"An Invitation to 5000 LAKES REAL FISHING TRAILS WOODS NATURAL BEAUTY A Michigan Vacation"

FRANK MURPHY
GOVERNOR OF MICHIGAN

"Speaking for the many thousands of Michigan citizens who will welcome you to our state this summer, I want you to know that all State departments will cooperate in making your vacation a pleasant and memorable one. Please accept this invitation to visit Michigan."

"This summer, share with us the beauty of this natural vacation land.

"For generations now, our people have been hosts to summer visitors from all parts of the nation. We have so much to offer—5,000 inland lakes; 1,600 miles of shoreline on four of the Great Lakes; acres of deep, green forests; wide, safe highways; 56 State parks; cities with industrial wonders; villages of quaint charm.

"Michigan offers recreational facilities of endless variety. Our climate is delightful and healthful. You may come to Michigan for an active vacation, or just to find a place to rest, rebuild your energies and renew the joy of living.

"We hope you will come to Michigan this year for your vacation."

STATE OF MICHIGAN TOURIST BUREAU
486 STATE CAPITOL, LANSING, MICHIGAN

YOUR VACATION GUIDE IS *Free!*

This picture-filled booklet shows you places to go—things to do on a Michigan vacation. Send for your copy of this free book today.

MAKE IT A
MICHIGAN
VACATION THIS YEAR

Navy In World War

(*Continued from page 62*)

who kept watch and guard night and day over our transport fleet, the American effort in France would never have been successful. The Navy's assistance was wholehearted and arduous, and was always given in a most generous spirit of coöperation."

Race Between Wilson and Hindenberg

When the issue hung in the balance in the spring of 1918 after the March drive, Lloyd George said: "It is a race between Wilson and Hindenberg." At that moment the Welshman, who was worth more in preserving British and Allied morale than an army corps, understood that the result of the mighty struggle depended upon whether America could land enough soldiers in France in time to check the German offensive. That was the supreme challenge to America. Wilson met it and victory resulted.

Biggest Transportation Job

Carrying the American Expeditionary Force across the Atlantic and bringing our troops home after it was over "over there" has justly been termed the "biggest transportation job in history." That achievement was accomplished without one American troop-ship being sunk on the way to France, and not one soldier on the way to the field of battle aboard a troop transport manned by the United States Navy lost his life through enemy action.

Nothing like this accomplishment has ever been achieved in human history. It was not only the most important but also the most successful operation of the war.

This monumental keeping open the road to France did not merely happen. It called for preparedness and courage. The first troopships under Admiral Albert Gleaves, Commander of the Cruiser and Transport Force, were subject to an abortive U-boat attack, which caused the Navy Department to intensify protection of transports. The lack of sufficient destroyers to meet all the demands compelled a choice of their assignment. Some naval officers believed all destroyers should be utilized in the areas around Great Britain and Ireland, where U-boat sinkings were most destructive, leaving the protection of troop transport ships routed to French ports to the naval craft of allied navies. The Navy Department put protection of the lives of soldiers above all else, as this telegram sent shortly after the arrival of the first soldiers of the American Expeditionary Force shows:

WASHINGTON, D. C.,
July 28, 1917

Admiral Sims, London:

The paramount duty of the destroyers in European waters is principally the proper protection of transports with American troops. Be certain to detail an adequate convoy of destroyers and in making the detail bear in mind that everything is secondary to having a sufficient number to insure protection to American troops.

Josephus Daniels.

Before the first troop-ship left the United States I had wired this instruction to Admiral Sims:

I hereby instruct you to furnish escorts, to consist of one division of destroyers for each convoy group from the point of meeting to the point of debarkation.

Kept Open The Road To France

It was because of complete compliance with that direction for full protection—and only because of it—that over two million American soldiers reached France in safety. After the March drive British ships were available. They carried a million American soldiers to the scene of war. Purely naval duty was escorting the troop transports, guarding them against attack by raiders or submarines. Of this duty the British Navy performed 14 per cent, the French Navy 3 per cent, and the United States Navy 82 per cent. Of the total number of troops 61,617 were under French escort, 297,903 under British escort, and 1,720,360 sailed under the escort of the United States Navy.

While not a single vessel of the Cruiser and Transport Force was torpedoed on the way to France, two, the President Lincoln and the Covington, were sunk returning, as was also the Antilles, an Army chartered transport not manned by the Navy. Two American transports torpedoed, the Finland, manned by a civilian crew, and the Mount Vernon, manned by the Navy, but both were successfully navigated to port and repaired. The Tuscania and the Moldavia, sunk while carrying American troops to Europe, were chartered British vessels, as was also the Dwinsk, which was sunk while returning.

Troops Brought Back After The Armistice

But that is only half the story. When hostilities ended, that vast army had to be brought back from Europe. For this, very little foreign shipping was available. Of the 1,933,136 Americans returned from November 11, 1918 to the end of September, 1919, the American Navy brought home 1,675,733; all other vessels, American and foreign, 257,423. During hostilities we had returned 11,211 sick, wounded, casualties, etc.; some were returned after September, so that the total number brought by the Navy from Europe to America ran well over 1,700,000.

Battleships As Troop Transports

The importance of promptly transporting soldiers back after the Armistice caused the Navy to requisition its older battleships to act as transports. "It will never do," said an Admiral. "Battleships are not fitted for such service. The soldiers will not be comfortable, and they will return home with bad impressions of the Navy." However, they were put into service and the first ones arrived wrote letters of thanks for the opportunity to round out their war service by a voyage on a battleship.

The war ended, the American soldiers were eager to get home and restive of every day's delay. As illustrative of this feeling, I was with the American Army of Occupation in Germany in March after the war and reviewed forty thousand soldiers and marines on the heights of Vallendar near the German fort of Ehrenbritstein. As the troops gathered around the improvised stand where I was to speak, I asked: "What shall I talk about?" From the thousands came back in chorus: "Talk about going home." I told them that the last man I saw before leaving the United States was Secretary Baker and we were making plans for their early return. They cried out again in unison: "How soon?" I was applauded when I answered in the only French I knew: "Tout de suite."

First War Order Issued

Next in importance to the big transportation job performed by the Navy, was its war on U-boats. Even before we entered the war, the Navy planned for such readiness. The first war order issued by the American Government for American participation in the war was signed April 14th, only three days after a conference in Washington between American, British, and French naval officials. "Fit out for long distance service," was the order to the Eighth Destroyer Division, which sailed from Boston under sealed orders.

We Are Ready Now

When they arrived at Queenstown, a few days later, Vice Admiral Lewis Bayley, with whom the destroyers were to serve during the war, asked, "When will you be ready to go to sea?" Commander Taussig gave the historic answer: "*We are ready now*," adding, "That is, just as soon as we finish refuelling."

"Things were looking black," Taussig reported. "In the previous three weeks the submarines had sunk 152 British merchant ships. The day before our arrival one of the British gunboats from our station was torpedoed and her captain and forty of her crew were lost." The Queenstown area comprised 25,000 square miles, and yet this wide zone of trans-Atlantic shipping, west and south of Ireland, had been left almost unprotected.

Great Work by Destroyers

Admiral Sims cabled that "cooperation of twenty-odd American destroyers with base at Queenstown would no doubt put down the present submarine activity, which is dangerous, and keep it down." Within a month 28 American destroyers were either at Queenstown or on their way there. On June 1st, Admiral Sims wrote the Navy Department:

"It is gratifying to be able to report that the operation of our force in these waters has proved not only very satisfactory, but also of marked value to the Allies in overcoming the submarine menace. The equipment and construction of our ships have proved adequate and sufficient and the personnel has shown an unusually high degree of enthusiasm and ability to cope with the situation presented."

By July, 37 American destroyers and two tenders were chasing the U-boats in that area. Others were sent as they were available. All but two of the destroyers we had when war was declared served in foreign waters. In all, 85 of our destroyers saw service in the war zone. The service they rendered, and the courage they displayed, proved that naval heroes of 1917-1918 were of the same stuff as Barry, John Paul Jones, Perry, Decatur, Farragut, and Dewey in previous wars. They captured U-boats and disabled others and did their part in reducing the sinking of merchant ships.

Protection of American Coast

On the Atlantic side, at the request of the British and French, our Navy took over the protection of the coast from Canada to the Panama Canal; thereby, when we entered the war, releasing ships those two countries had kept on this side of the world to insure the safe conduct of their tankers, indispensable for oil from Port Arthur and Tampico.

The next great contribution to winning the war by the American Navy was the conception of and large part in the construction of the mine barrage across the North Sea. It was built in answer to the President's question before we entered the war: "Why don't the British shut up the hornets in their nests?" Franklin Roosevelt and Secretary Redfield were two of the earliest and most enthusiastic advocates of that gigantic undertaking, which was hazardous and not believed practical by some British and American naval officers. However, under the leadership of Admiral Ralph Earle, the mines were manufactured and transported to Scotland and laid down by a force under the direction of Admiral Joseph Strauss and Captain R. R. Belknap. From the moment of completion it began to take toll of U-boats. "Eight and a half per cent of the total number of U-boats lost during the war were brought into the list of missing by the barrage which existed only six per cent of the period of the war," officially reported Admiral Ralph Earle, resourceful and efficient Chief of Ordnance.

The barrage, stretching across the North Sea from Norway almost to the Orkneys, was a new factor in war. It was the biggest naval offensive. American in conception, it was also mainly American in construction. A joint American and British undertaking, as it was, four-fifths of the mines laid were of American manufacture, made in this country, taken across the Atlantic in American ships, and laid by American naval vessels.

If Earlier, Might Have Ended Submarine Operations

In addition to the testimony of Admiral Earle of its great value, Admiral Strauss declared that "if the Northern Barrage and that across the straits of Dover had been fully completed as the Navy had planned, it would have ended the submarine menace so far as submarines going from the North Sea into the Atlantic were concerned." He also said that the building of the mine barriers across the Adriatic and Aegean seas, for which the Navy was preparing materials, "would have actually ended submarine operations." Thus the Navy's perfect answer was made to President Wilson's question in 1916: "Why don't the British shut up the hornets in their nest?"

The Navy That Flies

The first armed forces of the United States to land in France (June 5, 1917) were naval aviators—seven officers and 123 men, under command of Lt. Kenneth W. Whiting. Our aviators flew across the Alps and the Adriatic Sea; they patrolled the waters along the French coast, protecting the vast Allied shipping going into and out of the French ports and guarding the convoys of American troops, munitions and supplies. Our Northern Bombing Group bombed the German submarine bases and ammunition supplies in Belgium. Operating with their Belgian comrades, our aviators flew over the North Sea and battled with German aircraft over Heligoland, almost in sight of the home bases of the German fleet. They took part in the North Sea patrol in connection with the movements of the British Grand Fleet, and those assigned to British stations at Felixstowe and Portsmouth had a part in the famous Dover Patrol and kept clear the road from England to France. In all, our Navy had 44 aviation stations in Europe with a record of 5,091 war flights, covering a distance of 791,398 miles, exclusive of 18,000 flights in training. Forty-three submarines were attacked from the air, our aircraft being credited with sinking two U-boats, with probably sending down two more, and damaging others. An even more striking evidence of efficiency was the fact that during the last ten months of the war no surface craft convoy protected by American naval aircraft in the war zone was successfully attacked by an enemy submarine. Under the wise over-seas direction of Captain H. I. Cone, 570 aircraft operated and there were approximately 40,000 men enrolled in aviation before the Armistice. The story of their courage and daring constitutes one of the most brilliant chapters in the war.

"Their feats, their fortune and their fame
Are hidden from their nearest kin;
No eager public backs or blames,
No journal prints the yarns they spin;
Unheard they work, unseen they win."

Navy Radio Girdled the Globe

If the Germans had cut every cable, and their U-boats did cut some of them, the Government could have been able to keep in touch with Pershing and his Army in France, Sims in London, Rodman and Strauss in the North Sea, Niblack at Gibraltar, Dunnin the Azores—with all our forces and Allies. All radio was under the Navy Department. It constructed the most powerful radio station in existence in France, had wireless that spanned the Pacific, operated 59 commercial stations, and operated 55 stations from Panama to Alaska, and from the Atlantic Coast across the continent and the Pacific to the Philippines.

Immediately after the outbreak of the World War, in August, 1914, Commander S. C. Hooper, an able expert, was sent to Europe to study the latest developments in radio and war communications. Capt. D. W. Todd was made Director of Naval Communications. A year before we entered the war Admiral Bullard was made Superintendent of Radio Service and the Navy improved trans-ocean service with Europe by increasing the power of Tuckerton, N. J., and Sayville, L. I., the German-built stations the Navy had taken over. As the climax of naval achievement, on August 21, 1920, I received this radiogram from the powerful naval station built in France:

"This is the first wireless message to be heard around the world, and marks a milestone on the road to scientific achievement.
"La Fayette Radio Station."

When the war ended Lord Curzon in his epigrammatic style said, "The Allies floated to victory on a sea of oil." The first request made to the Navy by the French and British Allies after we entered the war was to patrol the Gulf Coast so as to safeguard the steady supply of oil from Port Arthur and Tampico, the main sources of supply, a duty which it performed perfectly. That oil was necessary for the Army was emphasized when General Foch warned that "interruption of the petroleum supply would necessitate an entire change of campaign and if long continued might result in the loss of the war."

The U-boats seemed to have uncanny success in sinking tankers. In order to save tankers from the dangers to which they had been exposed, it was decided early in 1918 to construct a pipeline across Scotland, Great Britain agreeing to bear the expense of material and the American Navy to provide the personnel and manufacture and transport the pipe lines. In one year the requirements of the Allies amounted to 2,900,000,000 gallons. 80 per cent of which had to be transported across the Atlantic. The pipe line secured a continuous and adequate supply of fuel oil for allied naval vessels, free from the danger of the tankers being sunk. Commander W. A. Barstow carried out the

construction and it was completed in four months.

Of course, no mention of this work of necessary protection was made public during the war and I have found that few Americans have heard of that achievement.

Making Seamen out of Landsmen

I have always regarded the making of 500,000 landsmen into sailors as "one of the most striking accomplishments of the war," to quote Sir Eric Geddes, First Lord of the British Admiralty, after his visit to the United States. Half a million men and thirty thousand officers were enlisted and trained within eighteen months and they brought new glory to the Navy by their courage and efficiency.

The Marines Won Glory

The story of the gallantry and achievements of the Marines, a branch of the Navy, who served with the Army in the World War, is one that brought them renown. There is no more thrilling chapter than that of how the men of the Army and Marines halted the Germans in the Chateau-Thierry sector when they were nearest to Paris and that city was threatened. President Wilson said they "closed the gap the enemy had succeeded in opening for their advance in Paris; and driving back the Germans began the rout that was to save Europe and the world." In the Battle of Belleau Woods (named, in their honor, 'Bois de la Brigade de Marine'), the Marines won gloriously by their courage and their heavy losses as they did in the Argonne-Meuse and other operations under that prince of soldiers, General John A. Lejeune. Upon their return, Secretary of War Baker wrote of the Marines to the Secretary of the Navy: "The whole history of the Brigade in France is one of conspicuous service. Throughout the long contest the Marines, both by their valour and their tragic losses, heroically sustained, added an imperishable chapter to the history of America's participation in the World War."

Heroes of the Sea

The loss of life was not large among those who "go down to the sea in ships." But the courage of those who counted their lives not dear unto themselves is worthy of an epic. Among those who were not born to die let the relation of one who made the extreme sacrifice illustrate the spirit of all who did not come back. When the CASSIN was torpedoed as it was patrolling off the Irish Coast, Gunner's Mate Osmond K. Ingram sighted it and took in the imminence of the sinking of the ship and the death of all on board. He realized that if the torpedo struck among the depth bombs astern, the explosion would sink the ship. Instantly he ran aft to strip these charges and throw them overboard. He was blown to pieces when the torpedo struck. The memory of that heroic gunner's mate, who made the supreme sacrifice to save his shipmates, is preserved in the name of a destroyer, the INGRAM, the first naval vessel ever named for an enlisted man. There is no rank in sacrifice.

Epic Letter from Aviator

The spirit of those who went West and of those who returned was expressed in an epic letter by Aviator Kenneth McLeish, who just before a daring flight which cost him his life, wrote his mother: "If I find it necessary to make the supreme sacrifice, always remember this: I am firmly convinced that the ideals which I am going to fight for are right. The life I lay down will be my preparation for the grander, fuller, finer life I take up. I shall live. You must not grieve. I shall be supremely happy, so must you—not that I have 'gone west,' but that I have bought such a wonderful life at such a small price, and paid for it so gladly."

Building a Thousand Ships

The construction program embraced practically a thousand vessels—275 destroyers, 447 submarine chasers, 99 submarines, 100 Eagle boats, 54 mine sweepers, and a number of gunboats and ships of other types. These, in addition to work on the capital ships and scout cruisers authorized in the Three-Year Program. Of this number 500 were completed before the end of hostilities. In addition 1,597 privately owned vessels, ranging from patrol craft to huge transports, were converted by the Navy for war purposes. There were 2,000 vessels in naval service before the armistice was signed. Navy yards and private plants speeded up construction, the destroyer WARD being launched seventeen and a half days after laying the keel at Mare Island Yard. Usually months were required to prepare plans and specifications. Under the direction of Admiral David W. Taylor, Chief of Construction, the ablest naval constructor in the world, and Admiral Robert S. Griffin, Chief of Engineering, an authority on engineering, all plans were ready when Congress authorized the Three-Year Program. The repair of the German and Austrian ships (aggregating 632,656 tons) interned before we entered the war, was a triumph of ingenuity and engineering skill. They carried 557,788 troops to France. We called them "The Fleet the Kaiser Built for Us."

The Navy's Key Men

In addition to the officers already named, any brief story of the Navy in the war would be wholly incomplete without a tribute to the key men who guided and carried out its policies. Next to the civilian Secretary and Assistant Secretary was Admiral W. S. Benson, Chief of Operations, whose devotion and wisdom won him such appreciation that President Wilson named him as Naval Advisor at the Peace Conference in Paris, and the Assistants, acting at times as Chief, Admiral William V. Pratt and Admiral Joshua McKean, who, with Benson, constituted an indispensable and able triumvirate; Admiral Charles J. Badger, who succeeded Dewey as President of the General Board, and who as naval statesman succeeded and worthily wore the mantle of Dewey, wise in Counsel; Admiral Frank F. Fletcher, who after a brilliant career as Commander-in-Chief of the Atlantic Fleet, was one of the wisest counsellors in many war activities; the initiative and superb voluntary service by the Naval Consulting Board under the leadership and genius of Thomas A. Edison; Admiral William S. Sims, dynamic and brilliant commander of naval operations overseas, who secured and maintained close and effective coöperation with the British Fleet; Admiral Henry B. Wilson, who in command of the naval base at Brest where most American soldiers landed, demonstrated executive capacity of a high order; the wise direction of the convoy system with headquarters at Gibraltar under Admiral A. P. Niblack; the presence and potent power of the dreadnaughts in the North Sea commanded by the incomparable Admiral Hugh Rodman; the value of the fine naval batteries, the most powerful batteries used by the Allies in France, under Admiral C. P. Plunkett; the vital post at the Azores under Admiral H. O. Dunn; the 100 per cent efficiency of the Bureau of Supplies under the resourceful Admiral Samuel McGowan; the capable heads of other Bureaus — Medicine and Surgery under Admiral W. C. Braisted, Yards and Docks under Admiral Charles W. Parks, Navigation under Admiral Leigh C. Palmer; General Barnett, Commandant of the Marine Corps; the Service of Supply under Admiral Hilary A. Jones; and scores of others on essential sea and shore assignment too numerous to name and whose service won imperishable glory for the Americans; and the able and resourceful teamworker, who had vision, initiative and the highest executive capacity, Franklin D. Roosevelt, the Assistant Secretary of the Navy.

No Glory for Civilian Secretary

When war began, a friend called at the Navy Department and said: "Daniels, you have a great opportunity and in your prosecution of the war you will win immortal fame." I replied by asking: "Do you know the name of any Secretary of the Navy who served during any war in which our country has been engaged, or the First Lord of the British Admiralty in any war where the British Navy was victorious?" He did not. "Even so," I said, "I have no illusions of achieving fame as I direct naval operations in this war. If there is any glory, it will go to the Admiral who wins the sea-battle. If there is any blame, it will go to the civilian Secretary."

Keeping Navy Seaworthy

(*Continued from page* 69)

1916 the first 16″ gun battleships of the Colorado class were authorized and contracts placed. Freeboard, watertight subdivision, tightness of closures, and protection against shell and torpedoes had reached a high standard in these designs.

The declaration of war with Germany on April 24, 1917 was followed by a period of intense shipbuilding activity. The interned German ships were quickly taken over, reconditioned, and prepared for transport service. Welding came into use about this time in the repair of damage which had been done to these ships by the interned crews. In seaworthiness our fleet during its service abroad compared most favorably with the allied navies.

The close of the World War brought in the period controlled mainly by Naval Limitation Treaties. Battleship construction was stopped. Size and tonnage limitations were put on several classes. These limitations resulted in great advance in the art of welding because of the premium on weight saving. Battleship construction is now again under way after a lapse of about sixteen years as work is started on the two 35,000-ton battleships North Carolina and Washington.

All classes of ships now receive most careful consideration from the standpoint of design, construction, watertight and gastight integrity, and scientific research in the laboratories and Model Basin. Strength and stability investigations of the ships in intact and damaged conditions have become an important part of the routine in a design. Damage control routine has been applied to all important units, and special consideration is given to gun-fire, torpedoes, mines and aircraft attack.

In view of our past experience and of the high order of ability of the personnel, officers and civilians, both in the Navy Department and in the field, we can rest assured that our Navy is *seaworthy* and ready for any tasks to which assigned.

USMA Sports

(*Continued from page* 76)

basketball and lacrosse, while the minor sports program comprises fencing, tennis, polo, golf, boxing, swimming, hockey, soccer and gymnastics, each well organized under its own coach, certainly a full menu compared to the 19th Century slim offering of sports.

Thus during the past seventy-five years has the Cadet Athletic program expanded from the lowly game of marbles to the present extensive program, climaxed as it is each year by the colorful and spectacular Army-Navy game played to over 100,000 spectators.

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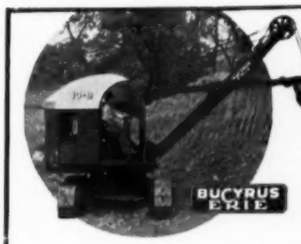

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Keeping the Sailor Healthy

(Continued from page 67)

Corps has steadily improved, until today's high standard in the care of the sick, both at sea and in our hospitals, equals the best that modern nursing affords. Their duties have extended beyond nursing, however, and today they are pharmacists, competent first aid men, technicians in the laboratories and dependable assistants to the medical and dental officers in all of their varied activities.

The services of trained female nurses have contributed no small part to the modern care of the sick in the Navy. Since the organization of the Nurse Corps in 1908, patients in naval hospitals, on hospital ships and overseas, have benefitted from the scientific and careful nursing their profession affords, and the sick aboard ship and at distant stations have been better cared for because of the instruction in modern nursing they have given the hospital corpsmen.

This evolution of the personnel of the Medical Department of today accompanied great changes in the Navy generally and vast improvement in the facilities for treatment of the sick. Wooden ships with their crowded, unventilated, damp living spaces; limited fresh water and monotonous diet of foods that could be carried in the holds, have given way to the modern steel vessels with their well ventilated, dry, warm living and working spaces, almost unlimited supply of distilled water and a ration that does not differ materially from the usual fare ashore. The old sick bay, customarily well forward, small, poorly lighted, often damp, always inadequately ventilated and with meager equipment is a thing of the past. Today the sick bay is in effect a small hospital, located in the most advantageous part of the ship and completely equipped with modern aids for diagnosis and treatment to efficiently care for practically any medical emergency. Expansion of naval shore stations has been accompanied by the establishment of dispensaries equipped to furnish the type of medical service their activities require, whether it be first aid at a small establishment or hospital care at some isolated station.

Development of today's chain of Naval Hospitals has been an outstanding advance. The hospitals in existence during the Civil War were practically all housed in buildings which had been converted to hospital use and left much to be desired in their equipment and the quality of the service they could render. In the years that have followed, buildings designed as hospitals have been erected wherever large numbers of men are stationed. They have embodied the best ideas in hospital construction when they were built and improvements have kept them up-to-date. They have been kept equipped with all modern appliances for diagnosis and treatment, and today they provide the Navy a hospital service as complete as is available anywhere.

The fleet's need for mobile hospital facilities has been met in the hospital ship. Lack of shore hospitals to serve the Western Flotilla of gunboats operating on the upper Mississippi during the Civil War actuated the conversion of a river steamer into our first hospital ship—the U. S. S. Red Rover. She had accommodations for seventy-five to one hundred patients and was equipped with the best facilities of her time for the comfort and treatment of the sick. The glowing reports of the service she rendered more than justified the undertaking, but after the war she was sold when the gunboats were disposed of. A hospital ship for the fleet, however, was not provided until 1898 when operations off Cuba led to the conversion of a passenger vessel into the hospital ship Solace. Since then a hospital ship has become an essential part of the Fleet. The present hospital ship, U. S. S. Relief, the first to be designed and built for the purpose, is in reality a floating hospital. She has accommodations for three hundred and fifty patients and is equipped to provide complete modern hospital treatment for the sick and injured as well as diagnostic and laboratory facilities for the Fleet beyond the equipment of the fighting ship.

The story of naval medicine during the past seventy-five years has been one of the great achievements in promoting the health and well being of the men, and of a continuous effort to provide the Service with the most modern diagnostic and therapeutic facilities for the treatment of the sick wherever they may be. Its future course cannot be foretold, but it can be confidently predicted that whatever the advances in the science of medicine or changes in the art of naval warfare, naval medicine will adapt itself to them and move steadily forward.

Merchant Shipping

(Continued from page 44)

have no quarrel with this arrangement but it is one that should work both ways. American customers of foreign concerns should practice the same arrangement. It would be a simple method of solving the economic difficulties of shipping. Theoretically it should cost no more because rates, by agreement, are presumably the same.

Beyond these, the poor patronage of American ships can be more or less directly ascribed to the labor troubles which have plagued some of our shipping, frequent sit-downs, whimsical quickies, strikes, and factional labor disputes, of the past few years have driven millions of dollars in shipments to foreign lines.

Damaging as it has been to the shipping business, the pitiless publicity provoked by the labor conditions in our ocean-going shipping, has had the beneficial effect of gradually awakening our seamen to their own responsibilities in the situation. A large majority of these men are honest, industrious and efficient and have the traditional American pride in their seamanship and in their ship. They realize the jeopardy to American shipping and to their own livelihood which lies in constant industrial strife. They resent with increasing force being made the objects of public disgust by the acts of a few who thrive through creating discord and who have no sincere interest in the merchant marine or in improving the lot of the American seaman. From these men is coming the stabilizing influence which today is being felt in maritime labor relations.

As important as new ships are to the restoration of the American merchant marine, trained crews are equally essential, a fact the Commission recognizes.

In the past, we not only failed to make replacements, but we took no steps to give the men who man our ships proper training such as other nations provide. The United States Coast Guard and the schoolships maintained by various states, have been training officers and have turned out some splendid men, but there is not a single training school for seamen in this country. There is no question but what a large part of the personnel problems with which we are contending on our ships can be directly traced to our own neglect in this respect.

The commission is striving to repair this neglect. The Merchant Marine Act places upon the Commission the responsibility of establishing minimum wages, and reasonable standards of living for the personnel on subsidized vessels. We are meeting this responsibility and while the improvements that we have been able to make in crew's quarters on some of the ships, have not been all that has been desired because of their age and design, quarters on all of the new ships will be unexcelled. This will do much to remove another serious source of discontent among sea-going personnel.

To provide the American seaman with a better opportunity for advancement which he has not heretofore enjoyed, the Commission has created the United States Maritime Service under which training schools for seamen have been established on the Atlantic Coast and the Pacific Coast where they are afforded intensive training with the idea of increasing their skill. This service is administered for the Maritime Commission by the United States Coast Guard.

This new Maritime Service is strictly a voluntary organization. No compulsion is placed upon the seaman who enrolls nor is he required to remain in the service once he has finished his course of training. However, members of the Service receive certain benefits by reason of their membership in the Service.

As a part of its training program, the Commission also has inaugurated a cadet system to provide training for the young men of the country who desire to make a career of the sea. Under this system, the cadets and cadet officers are trained at sea on government owned and subsidized ships for berths as officers. Since the Commission announced this plan, it has received 10,000 applications for cadet positions from all over the country. This indicates that the sea still holds a strong attraction for our youth. Still other plans are being made and they will be incorporated in a broad program for training personnel which will be laid before Congress for approval at its next session.

Government financial assistance for the merchant marine rehabilitation program is obtained through direct subsidies—a construction subsidy and an operating subsidy. These subsidies are designed solely to place the American steamship operator on a parity with his foreign competitors by equalizing the increased prices which he must pay for ships built in American yards, and the higher cost of operating his vessels under the American flag. The American manufacturer and the American farmer enjoy the same competitive equality with their foriegn competitors through the tariff which is nothing more than a subsidy in reverse.

Military Medicine, 1863-1938

(Continued from page 67)

were performed last week at the Walter Reed General Hospital than in the whole Army before the Civil War. Before the advent of "clean" or aseptic surgery, the entrance of a patient into a hospital for an abdominal operation was almost equivalent to a death sentence. Now the surgeon is permitted, chiefly by surgical cleanliness alone, to enter practically every region of the body. It is difficult to realize that before the eighties appendicitis was not treated surgically. How many monuments to "inflammation of the bowels" stand in the graveyards of the world testifying to our lack of knowledge of this important disease will never be known. Surgical operations were usually followed by suppuration, which was considered a necessary part of the inflammatory or healing process. During the Civil War the military hospitals were filled with infected, sloughing wounds, erysipelas, blood poisoning (now known as general septic infection), hospital gangrene, and secondary pneumonia. Because of the likelihood of extensive systemic infection following conservative treatment, amputation of shattered limbs was the rule during the Civil War.

Last year approximately 20,000 surgical operations were performed in the Army with a case fatality percentage rate of 0.6. The surgical operating room today is one of the finest examples of strict discipline and conscientious attention to the rules of the game, not one of which may be broken without danger to life itself. It represents probably the best example of the application of a scientific principle to any human endeavor and it all concerns nothing but microscopic germs.

The mechanics of medical practice in the sixties had limitations which, though they appall us today, really testify to the skill and resourcefulness of the old family doctor. Dr. W. W. Keen, of Philadelphia, one of the foremost surgeons in the Civil War and the dean of American surgeons at the time of his death in 1932, reports that he never saw a clinical thermometer used during the Civil War. It was still a novelty in Guy's Hospital, London, in 1870. The hypodermic needle, though known, was not in use because sterilization was not understood. Ether anesthesia, which was first employed in the forties, had only recently come into general use. Local anesthesia, spinal anesthesia, and many general anesthetics now used were unknown. Nitrous oxide (laughing gas) was known but not generally used. Even the stethoscope did not come into general use until after the Civil War. Many of the instruments of precision upon which we rely for diagnosis as well as treatment came years afterward, such as those for estimating the hemoglobin of the blood and counting the red and white cells, the blood pressure apparatus, x-ray, radium, and many others considered indispensable in medical practice today. Laboratory facilities were limited to examination of the urine and a very few simple procedures, for bacteriology and physiology had not been developed. The alliance of medicine with the exact sciences, more particularly physics and chemistry, has brought about the great advances in recent years.

The Civil War advanced our knowledge of medicine very little. What advances were made were in medical administration. Among these were Surgeon Letterman's system of evacuation of the wounded from the battlefield, first put into operation on a large scale at Antietam, and which is still the basic principle of medical field service in the American and European Armies. The other advances of note were the establishment of the Army Medical Museum, in Washington, the further development of The Surgeon General's Library, now the largest medical library in the world, and the compilation of the Medical History of that war, a rich treasure of medical literature. Each of these was the work of the Medical Department of the Army.

The developments in military medicine from that time on were chiefly in the field of preventive medicine, made possible by the advent of bacteriology. In this period the Army Medical Department has made its greatest contributions to human welfare and to the success of military operations. The groundwork was laid by the establishment of the Army Medical School in Washington in 1893 by Surgeon General George M. Sternberg, a pioneer in bacteriology, its foremost exponent in America, and the author of the first comprehensive textbook on the subject.

The list of subsequent accomplishments of Army medical officers is a long one. It began with the work of the typhoid board consisting of Reed, Vaughan, and Shakespeare, which studied the epidemiology of typhoid in the camps during the Spanish American War. It determined that typhoid fever is not necessarily a water-borne disease but is also disseminated through personal contact, directly or indirectly. Then followed the outstanding work of Walter Reed, who proved in Cuba that yellow fever is transmitted by the bite of a certain species of mosquito. The results of the findings of the Reed Board, from an economic standpoint alone, are tremendous.

Then followed the work of Gorgas in eradicating yellow fever in Cuba. For the first time in three hundred years, Cuba was free from yellow fever and the building of the Panama Canal was also made possible. There has not been a case of yellow fever originating in the Panama Canal for over thirty years and the disease has left Cuba and its epidemic centers in the United States.

The Army was instrumental in eradicating smallpox from Puerto Rico and by establishing a campaign of vaccination in the Philippines arrested that disease in all localities amenable to vaccination. It also established a semblance of health organization for the Philippine Islands. Uncinariasis or hookworm disease had been the cause of much disability in Puerto Rico, a large proportion of the population suffering from anemia caused by the parasite. Ashford's recognition of the real cause freed Puerto Rico from one of its menaces to health and prosperity.

Perhaps the outstanding contribution to military medicine was the work of Russell, then Captain Medical Corps, who introduced typhoid immunization into the United States in 1908. This became voluntary in the Army in 1909 and compulsory in 1911. Up to that time typhoid had been a military curse,

sure to accompany troops in the field and a frequent visitor at every garrison. During the Spanish American War it accounted for 20,000 cases and 2,000 deaths. Last year there were only four cases in the entire American Army, all in the Philippine Islands. For over two years there has not been a case of typhoid fever in the Army in the United States. The Medical Department in the Philippine Islands also contributed substantially to the maintenance of health of American forces and the improvement of health conditions among the natives. This work has been directed largely toward the intestinal diseases, dysentery and sprue. Beriberi, a disease causing much disability among the natives, is now controlled by providing the vitamine resident in the pericarp or shell of the rice kernel. Rinderpest, a disease which killed about 18,000 carabao and cattle each year in the Philippine Islands prior to 1926, has been quite completely eradicated by a vaccine prepared in 1928 by Kelser, a veterinary officer. In Manila Siler demonstrated the transmission of dengue fever by the mosquito. General Darnall introduced chlorine in the purification of drinking water. Today chlorine is universally used in municipal water purification plants and was the principle underlying the use of the Lyster bag during the World War.

During this period of seventy-five years, almost every advance in medical science has been bent to the use of the military forces. With what result must be told by the parallel columns exhibiting the general run of sickness and the special "camp diseases":

Yearly Rates per 1000

	Civil War	World War	1938
General Admissions	2747	987	632
Typhoid Fever	33.54	0.37	0.02
Intestinal diseases ..... (many were typhoid)	711	21	20

Military medicine in 1938 is concerned not with uncovering secrets of medical science but with consolidating the advances of medical practice and applying them to military conditions. The full force of medicine as a military asset cannot be made effective without the administrative hand. This has been proved in such diseases as smallpox, diphtheria, and venereal diseases. In each of these diseases, medicine has shown the cause and the means of protecting the individual. The state has yet to be aroused to its full responsibility in applying these measures to the public welfare. So it is in the military service. Medicine cannot make its maximum contribution to the military service without organizing, planning and training. Our nation can no more rely upon its unprepared civilian medical profession in war than it can rely upon unorganized and untrained citizen soldiery. We have seen examples of medical unpreparedness in the Revolutionary, Civil, and Spanish American Wars. Not until the World War was there any degree of preparation. The result was a greater salvage of human beings than in any war in history. It was an organized medical service of approximately 30,000 officers, 20,000 nurses, and 280,000 enlisted men that provided hospitalization for over 4,000,000 men during the World War and evacuated over 250,000 casualties in the American Expeditionary Forces in France.

The 1938 conception of medical preparedness contemplates the mobilization of the medical resources of the country that they may be utilized in an orderly way for the benefit of the potential as well as the existing military forces.

CCC and Industry

(*Continued from page* 45)

The automotive industry is the largest consumer of the products or user of the facilities of other major industries such as railroads for transportation; the petroleum industry for gasoline and lubricants; the rubber industry for tires and tubes; the plate glass industry for windshields and other glass; and allied metal industries for iron, steel, lead and nickel. In addition, it is also a large user of the products of the textile and lumber industries. It will be readily understood, therefore, that the procurement of motor vehicles affects indirectly all of these industries.

From the examples given it can be seen that the major industries of the United States have benefited and are still being aided in no small degree by CCC procurements for the construction, operation and maintenance of the camps, but this phase of the operation, beneficial as it has been, is far less important to the country as a whole than is the money spent in the enormous business of clothing, equipping and feeding the men. These young men and boys come from families where, because of lack of funds, there was an actual shortage of food adequate for health. The supply of these items to the CCC created a new market which otherwise would not have existed.

The equipping of an enrollee includes not only the furnishing of his clothing but the supply of such articles as beds, mattresses, sheets, pillows and pillow cases, towels, toilet articles and so forth for the use of the individual. The clothing and equipment items include everything to keep men in camp comfortable in summer and warm in winter.

While the immediate effect of the large purchases of clothing and equipage has been felt principally along the Atlantic Seaboard because of the location in that area of the majority of the industries involved in the production of the articles procured, the indirect effect, through the purchase by manufacturers of the raw materials required—extends throughout the entire country.

The more than two and a half billion pounds of food issued to enrollees in the past five years has furnished orders for manufacturers and dealers in foodstuffs amounting to more than $495,937,000. When it is realized that the raw materials from which these foods are produced must be moved from the farms to the factories, packing houses, canneries, etc., engaged in their production, or to the markets for sale; that materials for the manufacture of containers, shipping cases, etc., must also be moved from the place of origin to the point of production; and that the finished products must be distributed to the camps located in all parts of the country, it will readily be seen how vast is the effect upon the railway industry of this single phase of maintenance of the CCC. In addition, the railroad industry has profited considerably by the expenditures necessary for transporting the large numbers of men and the vast quantities of goods necessary in the operation of the CCC work projects.

All the various lines of business and industry involved in the maintenance of this large body of men depend for their operation on man power which, of course, means employment of men and payment for services rendered. A large part of the funds expended, therefore, finds its way into the pockets of working men and is again put into circulation for the support of their families. Likewise, the money contributed by CCC enrollees to dependent families or relatives is recirculated for the support of those families. This money, expended regularly from day to day, week to week and month to month, creates a steady flow of funds through the banks and other financial institutions, the benefit of which cannot be estimated.

Ordnance and Industry

(*Continued from page* 51)

partment is also interested in following inventions whether they be of fundamental nature or whether they be merely improvements of existing mechanisms. Unless these industrial developments are followed and applied in Ordnance matériel in time of peace, only delay can ensue in time of war because the engineers of industry will not be satisfied either with the product or with the method of its production.

Many of these problems are difficult to solve because of the inherent nature of the Ordnance problem. Their solution depends of necessity upon the developments of industry and the ability of the Ordnance Department to apply these developments not alone in its product but also to its facilities and its methods of production.

Our munitions position twenty years after the World War is almost identical with what it was before the War, except that we have learned one big lesson. That lesson we call "Industrial Preparedness."

Our six Ordnance manufacturing arsenals are capable of producing less than ten per cent of our requirements for war. As a result, commercial industry must be converted or expanded immediately at the outbreak of hostilities to take care of the great bulk of the fighting tools. If the demand for guns and ammunition were as great as the demand for automobiles, American industry, given time, would meet the demand. However, the transition of an automobile manufacturing plant will take a considerable period of time. In fact, the conversion of a company manufacturing sporting rifles to the production of military rifles or machine guns requires skill and ingenuity, especially if time is the essence.

The design of Ordnance is a highly specialized science and its production a highly specialized industry. Scientific accomplishments in the field of transportation, communication, manufacturing and all other technical fields have their effect in change of tactics, training methods, and the resultant change in types of weapons. Modernization implies the development, adoption and acquisition of the most effective products.

The problem of Ordnance in war is the problem of mobilization and coordination of science and industry with the military establishment. This is a problem of optimum and serious importance, as the simple fact is that practically all industry in time of modern war must be either primarily or secondarily engaged in the conflict.

Fundamental to Ordnance success is—"Conformity to commercial standards, processes, and practices." The more intelligently we answer the industrial problem now, the less disruption of industry and the quicker we can secure what is required in war.

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National Defense and the Aviation Industry

(*Continued from Page 46*)

At the close of the War, a pall fell on American aviation, a destructive blight which was common to all industry the world over. It fell to our lot to tear down the tremendous structure we had built up; we had to reduce the output of our factories to peace-time consumption; worse, we had to discontinue production at even the peace-time rate of consumption until we had consumed the vast surplus of stores, supplies, planes and engines left over from the war. We had to disband and return to civil life that vast air army we had enlisted and trained to meet war-time requirements. That depressing post-war period has been called the "doldrum years in aviation." Even in those dark days, the Army Air Corps was the aviation industry's best customer. In addition to spending from twenty to twenty-five million dollars per year, it wisely spread that sum out so as to give work to as many manufacturing establishments as possible in order to keep them alive.

The Army Air Corps made several other essential contributions to post-war aviation. High on this list was the establishment of the Matériel Division at Wright Field, Dayton, Ohio. There the Army Air Corps assembled a group of skilled engineers and built up a test plant for experimentation and research which, I believe, has done more than any other one agency in this country to account for our present striking success in aeronautical development.

The Army has consistently supported pilot training, having established its Air Corps Training Center, the largest flying school in this country, which is generally recognized as one of the best in existence. It was the group of ex-Army flyers called the "gypsy pilots" who first made America air conscious. They took their training planes to every village, hamlet and town in the country and, by their demonstrations and the thousands of passengers whom they carried, took flying to the American countryside.

Army pilots performed many of the striking flight exploits which served to focus world attention on the American aviation industry. Among these were the first flight around the world, the dawn-to-dusk flight across America, the first transcontinental non-stop flight, and world records for speed, altitude and endurance.

Our military air arm flew the first air mail, inaugurating the system, and turned over to the Post Office Department the planes and personnel with which to continue it as a Government function. The Army laid out and flew for several years the first model airways. The flying experience gained proved invaluable and pointed the way to the civil airlines which were to come. It took the lead in the production of air maps, in the development of night flying equipment, radio, plane and engine instruments, and other valuable aids to navigation.

This work of the Army Air Corps, which has proven invaluable to civil aviation, still continues. It has been scarcely a year since the Matériel Division at Wright Field developed and demonstrated the automatic landing device. More than fifty successful landings employing it have demonstrated the feasibility of automatically, mechanically controlled flight. When this equipment is perfected, standardized and placed on all transport craft, it will predict the day when weather will be practically eliminated as a hazard to the air journey. Experiments at Wright Field in pressure cabin development, now practically completed, have been the basis for the strato-liner development. Controllable pitch and constant speed propellers, "tricycle" landing gears, retractable landing gears, and many other of the modern innovations which have made the present highspeed, magnificent air giants possible, owe their inception to experiments initially pursued in the Army.

In thus emphasizing the part the Army has played in the development of aviation, I do not mean to minimize the prominence of civil aviation in this country and the part that the civil industry plays in our national defense. The Army Air Corps does not build its own planes and engines. It supervises their building and indicates the plans on which they are built. But the work is done in the civil factories. The civil aviation industry in this country is an indispensable adjunct to our national air defense. Our civil air industry has always cooperated wholeheartedly with the military establishment in the development of the finest and fastest planes, the largest and most reliable engines and the best accessory equipment obtainable.

Under our traditional military policy, this nation of ours does not propose, and never has maintained in peace-time an establishment of a sufficient size to conduct a major war. What it does propose to have is a trained nucleus and the plans and production capacity to enlarge that nucleus rapidly to a war-time footing. Thus, we would have to rely on our civil aviation industry at the outbreak of a major emergency to produce the planes, engines and accessory flying equipment to give us an adequate air establishment.

Civil aviation promotes the national defense in another important way. The great network of civil airways which has been developed and is now operated with commendable efficiency, provides the sky roads which would be used in assembling our air force at the threatened point and in moving it rapidly from one section of the country to another, day or night. The landing fields, the lighted airways, the radio and weather stations would all be usable by our military establishment without delay or change in the event of an emergency. They would play the same part in air mobilization schemes which railroads and highways would play in our ground troop concentration efforts.

Military and civil aviation in this country have come thus far hand in hand, each mutually sustaining and supporting the other. The safety of our air frontiers depends on a continuation of that combined effort.

American Field Artillery

(*Continued from page 53*)

not demanded by necessity. The eve of the World War saw a change in this matter approaching, which burst upon us with our entry into that European conflict. Specialization resulted immediately, to meet the demands of the highly specialized mechanism of trench and stabilized warfare and the new tools which had appeared. Motors, radio, telephone, sound ranging, map firing, new and a variety of types of weapons—these all could not be absorbed by every man and we found ourselves with a huge number of specialists and emerged from the war with a greatly changed organization and character.

This specialization was inimical. It led to ruts of thought and action, and to cumbersome organization. In the years since the War, by cleaving assiduously to the essentials, specialization has been retained in only the things where absolute necessity requires it. Even respecting these, while aspects of specialization remain, they are no longer inimical. There has been a transition to a versatility in enlisted man and officer that represents the highest type of efficiency. Field Artillery officers of the present day are required, every one, to kick, run, and pass; and there are few in the enlisted ranks of the arm who can't do likewise. Some are better in certain lines than others, naturally: these we use to teach their skill to others. This change in the character of field artillerymen is notable progress; it fits the American mode of thought and training and it makes for efficiency of the whole.

* * *

Progress must be deliberate to be certain: untoward haste may mark retrogression. Progress in field artillery efficiency is definite and gratifying, and is still going forward. No revolutionary developments have appeared and none are in sight. Ammunition and fuzes have been improved in a very satisfactory sense. All existent weapons have been materially improved and new models in all types have been developed for production should the need arise. Tactical doctrine keeps pace with changing methods of warfare which result from the application of new tools to what, it must be remembered, is an ancient art, the principles of which are immutable. The Field Artillery stands ready to supply that ever increasing need for powerful artillery fire support which successful combat operation of armies is day by day requiring in constantly increasing ratio to all their other component arms.

The U. S. Coast Guard

(*Continued from page 43*)

Several cutters rendered outstanding service. The McCulloch, with Dewey at Manila, the fastest ship in the fleet, carried the dispatch from Dewey to Hongkong where it was put on the cable to inform the rest of the world what had happened at Manila. Less well known, but more important eventually when the American Army occupied the islands, is the fact that the McCulloch, on one of her trips from Hongkong, transported the insurgent native leader Aguinaldo and thirteen of his leading supporters back to the Philippines. In the naval engagement at Cardenas, on the coast of Cuba, the rescue of the Navy torpedo boat Winslow by the cutter Hudson resulted in one of the most heroic actions of the war. Altogether, the Revenue Cutter Service aided the Navy with thirteen cutters carrying 61 guns, 98 officers and 562 enlisted men. In addition, seven other cutters aided the Army in its transport work.

During the participation of the United States in the World War, the Coast Guard operated directly under the Navy Department. For the first few months after April 6, 1917, Coast Guard officers were not assigned to Navy ships. Nonetheless, many officers took over shore duties, such as chiefs of staff, aides for information, section commanders, district naval force commanders and the like, thereby making naval personnel available for sea duty. After November, 1917, Coast Guard officers were drawn from Coast Guard units and assigned to naval vessels. Vacancies on the cutters were largely filled with officers and men of the naval reserve.

War requirements greatly extended the communications work of the Coast Guard. Before the war, one man at Headquarters handled this activity. By the time of the Armistice, a division of communications had been established at Headquarters, under three commissioned officers assisted by nine more in the field.

The ordinary work of most of the geographical divisions fell off somewhat during the war, but with wartime shipping activity concentrated at New York, that division worked overtime. To the burden of supervising a greatly increased number of anchorages was added the necessity of extraordinary precaution to prevent in New York harbor a disaster such as occurred at Halifax. Details of Coast Guardsmen were placed aboard all barges carrying explosives to keep out unauthorized persons.

Six cutters went across the Atlantic to aid in patrol and convoy duty in the War Zone. For over a year these ships carried on without accident. But on the night of September 26, 1918, the cutter Tampa, Captain Satterlee commanding, was sunk, probably by an enemy torpedo, with her entire complement. The Tampa had accompanied a fleet of merchant vessels from Gibraltar, the base of the cutter squadron, into Bristol Channel. In accordance with instructions she left the convoy and proceeded toward Milford Haven. She presumably encountered an enemy submarine, for the Tampa and her eight officers, four warrants and 100 enlisted men never returned to port. Next to that of the Cyclops, this was the biggest single loss suffered by the American Navy.

Important as the wartime duties of the Coast Guard are, they are not the most significant of the service operations. Coast Guardsmen may rightly be called maritime police, but to give them the nickname "G-men of the Sea," distorts the picture. To the average person "G-man" connotes activity designed purely to track down and secure evidence against malefactors. Police work, however, is also regulatory and protective in our complicated modern society. A mere glance at the varied statutory duties of the Coast Guard will serve to show how greatly the Service concerns and has concerned itself with protective and preventive work.

Since 1837, it has been the duty of the cutters "to cruise upon the coast . . . . to afford such aid to distressed navigators as their circumstances and necessities may require." Coast Guard archives are full of records of aid to ships in distress. For instance, on January 18, 1884, the City of Columbus went aground in Vineyard Sound, because of a terrific storm, and many of the passengers were swept into the sea. Some were saved, however, by the capable work in a "routine emergency" of the men aboard the cutter Dexter. Lieutenant Rhodes actually swam through the raging surf and succeeded in getting off the last two people.

One scarcely need mention the heroic work that the men in the Life-Saving branch have performed in line of duty year after year. The exploits of such men as Joshua James have become almost legendary along the coast.

If modern highways secure the reputation of being carefully patrolled by police, lawless driving tends to approach a minimum. In exactly the same manner, the coastal police by developing a successful reputation for anti-smuggling activity have practically eliminated cargo smuggling into our ports. Year-in, year-out "trailing" of suspected vessels has gradually had its intended effect. Occasionally, of course, when conditions make smuggling especially lucrative, the Coast Guard decidedly has its hands full. Such a condition prevailed during the "Prohibition Era." The challenge was met in several ways. Twenty-five destroyers, secured from the Navy and recommissioned, were based at New London. Many temporary officers and men were appointed; classes at the Academy were speeded up. In fact, the activities of the Coast Guard were put on a quasi-war footing. By 1927, notorious "Rum Row" had been broken up, but, of course, as the American people became progressively weary of the whole "noble experiment" smuggling efforts continued. Today the Coast Guard has to meet the problem of smuggling arms and war supplies out of the United States to war-torn Spain. Just as the Revenue Cutters were the enforcement agents of Thomas Jefferson's embargo acts, today the Coast Guard is enforcing the Neutrality Laws.

Other regulatory activities of the Coast Guard are also well-grounded in statutory law. In 1908, the Secretary of Commerce and Labor was charged with the responsibility of policing regattas and marine parades. Since that time, the Commerce Department policy has been to request the Coast Guard to protect the safety of man and boat at such events as the Harvard-Yale races, the Poughkeepsie regatta, and the International yacht races. Since 1910, the service has also helped the Commerce Department enforce laws regulating motor boat equipment on the navigable waters of the United States. Enforcement of navigation and other laws governing merchant vessels, enforcement of laws pertaining to quarantine and immigration, destruction of derelicts at sea: these and many others are part of the Coast Guard duties. In 1936, Congress completely recognized the police nature of the Service's work by passing a bill, approved June 22, 1936, empowering commissioned, warrant and petty officers of the Coast Guard to "make inquiries, examinations, inspections, searches, seizures and arrests upon the high seas, and the navigable waters of the United States, its Territories, and possessions." This liberal grant of power is to be used for the prevention, detection and suppression of violations of laws of the United States. Thus the statement of Senator Wadsworth, at a hearing in 1924, that "one of the functions of the Coast Guard is

that of a coastal police" has been substantiated fully by legal enactment.

Two special fields of Coast Guard activity deserve separate treatment. These are the work in and near Alaska, and the International Ice Patrol. Since 1867, the Revenue Marine and the Coast Guard have acted as agents of the national government in the Alaska region. In less than ten days after the ratification of the treaty for the purchase of the territory from Russia, the revenue steamer Lincoln, under the command of Capt. John W. White, left for the north. The results of this first trip to Alaska typify many that came later by other cutters and men. Captain White and his officers obtained much information regarding the geography, resources, production and climate of the newly acquired land. The Service is authorized to preserve law and order; to help the native population wherever possible; to explore and survey unknown and uncharted bays and harbors; to help the Department of the Interior with its administration of the educational system; and to protect seal and salmon and halibut fisheries.

At least four cutters of the Service have secured well-earned fame in carrying on this work in the Alaskan region. From 1881 to 1885, the Corwin made annual cruises to the waters off Alaska. The cruise in '81 has been ably reported by the famous naturalist, John Muir, who made the trip that year. In order to patrol the Yukon after the Klondike gold strike, the Nunivak, of lighter draft than ordinary cutters, was constructed and commissioned. To render special help in the Bering Sea region to explorers and whalers, the cutter Bear went into service in 1897. It had a long record of high adventure and monotonous routine assistance before replacement by the Northland in 1927.

The disaster that befell the Titanic in 1912 aroused international feeling that something must be done to patrol the traffic lanes of the high speed liners through the iceberg area. Since 1914, except for the two war years of 1917 and 1918, the Coast Guard has annually patrolled the Atlantic Ocean off the Grand Banks where icebergs are thickest in the spring months. Bergs are located and charted and their positions thereafter are checked frequently. The cutter on patrol broadcasts four radio reports daily to merchant and passenger vessels in the lanes. The cutter designates the northern limit of the steamer tracks in accordance with ice conditions. Serious efforts are made toward the scientific study and reporting of oceanographic and meteorological conditions. There has been no repetition of the Titanic's fate.

Despite this record of duties successfully completed, the course of the Revenue Marine and the Coast Guard since 1863 has not always been smooth. Personnel problems cried for solution, but Congress and the American people heeded the cry of the rapidly developing Middle West, not the sea. Accordingly, the Revenue Marine suffered the same neglect bestowed on the Navy during this period. Nonetheless, as Secretary of the Treasury, George S. Boutwell seriously attempted to improve the service. A commission appointed by him in 1869 advocated smaller vessels and lower operating costs. Furthermore, they stressed the need of centralization (as opposed to the existing responsibility of the cutters to the collector of customs at the port where stationed) and of more stringent regulations. Accordingly, in 1872, the Revenue Marine Division was set up in the Treasury Department under Sumner I. Kimball. He instituted policies which are still basic, such as: "central authorization of expenditures; reports and inventories from those in charge of cutters; submission of accounts and logs to headquarters; inspection of cutters; prohibition of the use of cutters for other than government business." He left the Revenue Marine in 1878 to head the Life-Saving Service until the two were joined again in 1915 to form the Coast Guard.

Problems relating to personnel, however, long cut into the efficiency of the Service. There seemed to be discrimination against the Revenue Marine officers and men. The highest rank attainable before 1908 was captain, equivalent at that time to major in the Army and lieutenant-commander in the Navy. In 1891, the Annual Report of the Revenue Marine stated that there was no age or disability retirement for members of the Service. Furthermore, there was a reduction of pay for leave of absence for more than 24 hours. Enlisted men were dissatisfied because the pay scale of 1863 was still in force when living standards had decidedly changed. Many of these personnel problems were solved in 1908 when Congress took desired action, but members of the Life-Saving Service were still without military status and received it only when the Coast Guard was formed in 1915.

Prior to that year, however, both the Revenue Marine and the Life-Saving Service almost lost their individuality several times. In 1883, a serious effort was made to transfer the Revenue Cutters to the Navy Department. Similar attempts were made in 1889, in 1892 and in other years. Occasionally officers of the service felt that such a course would be desirable because of the under-ranking and under-pay indicated above. Finally the most serious threat came in 1912 when a committee appointed by President Taft on the subject of economy and efficiency in government made its report. Had the contents of this document ever formed the basis for a law, the Life-Saving and Lighthouse Services would have been amalgamated, while the Revenue Cutter Service would have been abolished and its work spread among the several departments.

Nothing came of the definite suggestions made in this report because there was another group in and out of Congress, a group which was convinced of the necessity and value of reuniting the Revenue Marine with the Life-Saving Service. These men felt that amalgamation would improve the maritime service of the nation because of closer cooperation between sea and coast life-savers and because of the desirability of continued performance of law enforcement and protective work by a unified Federal maritime agency. They fully believed that union would result in simplification of administration. Experience has fully justified their belief. Also important, military retirement and disability provisions were to be extended at long last to the Life-Saving Service. S. I. Kimball expressed himself as definitely in favor of amalgamation. President Wilson apparently campaigned actively for the bill. It became law on January 28, 1915.

The Coast Guard today has progressed to a position of great significance in the government's law enforcement program on the sea and to a position of respect and admiration in the hearts of its many friends along the coasts and in the flood areas of the Mississippi Valley. Moreover, the renewed interest of the American people in the merchant marine has added a new duty to the many hitherto performed by the Coast Guard for the security of our shipping. Today the American people are demanding more efficiency in the operation of the merchant marine. Entrusted with answering this demand, the Maritime Commission has set up a system to provide government-trained personnel for the merchant service. The Commission has chosen the Coast Guard to organize and conduct this training program. This choice was dictated by the fact that the Coast Guard is the Federal maritime agency in closest contact with the needs and problems of the merchant service and because of the specialized education and experience of the Coast Guard personnel. Further, the Coast Guard, responsible for Federal police work at sea, is, by virtue of that fact, responsible for sending its men out in fair weather and foul to enforce the law and to rescue men and ships from disasters which often occur through errors of personnel. A training program for the merchant service that will help decrease disasters at sea will tend also to reduce the frequency of risk that distress operations now throw on ships and men of the Coast Guard. Thus, as a preventive measure against disasters and against violations of the law, it is both logical and fair that the Coast Guard should have a hand in the merchant service training program.

The Coast Guard Academy, various training schools, and the Coast Guard Institute provide both theoretical and practical bases for Coast Guardsmen's specialized education. Commissioned officers of the Coast Guard (526 in number) are graduates of the Academy at New London, Conn. This up-to-date collegiate institution is the outgrowth of an original law of 1876 permitting cadetships in the Revenue Cutter Service. For some years the schooling consisted of practice training aboard the bark Chase. As the needs of the service changed, as, more and more, engineering and law came to be the sine-qua-non of a modern officer, a permanent school was set up at New London at old Fort Trumbull. The curriculum was extended to three years and then, in 1931, to four years. During the next year, a $2,500,000 plant was built, up the Thames from the old site. An advisory board of representatives from outstanding engineering schools in the country assists the Coast Guard in determining policy for the Academy. A corps of permanent professors from civilian institutions was appointed in 1937. Most of the instruction, however, is still given by line officers assigned to the Academy for four-year details. In addition to the Academy's training, Coast Guard officers are required to continue their study of the law after graduation, and before every promotion must pass exhaustive examinations in a broad range of professional subjects. Every year a number of commissioned officers are assigned to graduate work in the law, engineering, and radio at leading American institutions.

Ably supporting the commissioned corps are 388 chief warrant officers and 171 warrant officers. These are seasoned men, both in their specialties and in the Coast Guard; they carry out the normal duties of chief warrant and warrant officers. Moreover, many serve in positions of added responsibility, as commanding officers of 125-foot patrol boats and smaller craft and at times as watch or engineer officers aboard larger vessels. The Coast Guard always takes pleasure in laying at the door of its chief warrant and warrant personnel a generous share of responsibility for its efficient and generally successfull operations.

In final analysis, as all military experts will agree, an outfit and its officers must be judged by the performance and morale of its troops. Cold, hard statistics write the record of Coast Guard achievement, but the writing is made possible by those human elements of loyalty, courage and untiring devotion to duty that characterize its 8800 enlisted men, the men who haul on the Coast Guard's lines, fire its boilers, pull its oars, keep its long vigils in radiorooms and lookouts afloat and ashore. These men are trained men, and more than justify the lengths to which the Coast Guard goes to train them. Many deck petty officers are in charge of patrol boats (80 feet and under) and like commissioned and warrant officers are charged by the 1936 Act of Congress with enforcement of Federal laws. These men, therefore, must take correspondence courses and attend lectures in law and law-enforcement problems. The Coast Guard maintains a Radio School to train its specialists in the radio branch, with particular emphasis on distress and law-enforcement operations. The service sends its gunner's mates and machinist's mates to the Navy's school for these branches. Other enlisted men are given aviation training at the Pensacola Station. Aboard ship and at stations (lifesaving) ashore, training schedules are part of each day's routine, with special attention to boatmanship, seamanship, and gunnery. The Coast Guard Institute, at Fort Trumbull in New London, Conn., provides a wide variety of correspondence courses, planned in accordance with the needs and duties of the Coast Guard, primarily for its enlisted personnel. Rating specialty courses for each higher rating must be completed satisfactorily by every man in the Coast Guard before he is advanced. Through the Institute advanced work may also be done in such subjects as navigation, gunnery, ordnance, radio, and seamanship.

Thus the enlisted men of the Coast Guard are kept abreast of the changing times. The transition from reciprocating plants to electric drive and diesels, from silence to radio, from land and sea to air, from the deep sea lead to the fathometer, and from the "by guess and by God" of a past era to the precision instruments of the present—all this has been accomplished smoothly and in accord with a long tradition neatly tucked into the Coast Guard's motto: Semper Paratus.

In 1790, Alexander Hamilton organized the revenue service to "secure the customs." In 1864, the cutters received the designation: "The Treasury's Naval Force." Today, from its original circumscribed field of action, the Coast Guard, by normal process of Congressional and administrative action, has grown until it fills a logical and necessary position as the nation's seagoing protective and law-enforcement agency — a maritime police force of broad powers and broader possibilities in our complex mechanical civilization and in the national economy.

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The U. S. Navy Today

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once governed us by treaty obligations have failed and there is no stability left to that balance of sea power that once obtained by international agreement.

The aviation arm of the Fleet is as indispensable a part of the whole as cruisers, destroyers, and submarines. The power and efficiency that aircraft has added to the Fleet cannot be overestimated. After years of experience as to what is required strategically and technically of Navy aircraft, the heavier-than-air operations have been divided into four fields:

(a) Tender-based patrol bombing planes or flying boats.

(b) Shipborne seaplanes on battleships and cruisers.

(c) Shipborne landplanes on aircraft carriers.

(d) Aviation detachment of the Fleet Marine Force.

Aircraft has not to date supplanted any other naval type. Naval aviation relies upon ships and ships upon naval aviation in a coordinated effort to further the mission. Fleet air work is paramount and the Navy is fortunate in having a fleet air arm that is a vital and integral part of the fleet, speaking the same language, indoctrinated in the same basic plans and understanding the important part they must play as advance guards, scouts and the air arm in battle of the first line of defense.

I have repeatedly maintained that appropriations for future building will be sought only on the conviction that the expansion of naval building by other powers compromises our relative naval strength and, hence, our security. It is security that we propose to maintain. A complete breakdown of international agreements in limitations of armaments, together with the troubled international situation, causes us to look even further in our study of defense than the number of ships in a navy. Ships must have bases, upkeep yards, and facilities.

We propose to make a complete study of bases, maintenance, and overhaul facilities, and to that end a special board of qualified officers has been appointed. The results of their study and investigation will be made known to the next Congress. The Navy will then make recommendations on the basis of the facts established.

In order to man this fleet and keep it in readiness for emergency the enlisted personnel has been increased and at this writing numbers 105,000. Every effort is being made to press the need of an adequate, efficient merchant marine and the training of reserve officers and men. A new Reserve Personnel Bill has just become law and many problems in regard to Reserve personnel have been clarified by this legislation.

The United States Marine Corps, an integral part of the Navy, has at present a strength of approximately 17,000 enlisted men and 1,200 officers. Recent legislation has authorized an additional 1,000 enlisted men for the coming year and an increase of approximately 320 officers over a five year period. Marine detachments are serving on board 53 vessels of the Navy and in practically every Navy Yard and naval station in the United States and abroad. In China, Marines are stationed at Shanghai, Peiping, and Tientsin, guarding American interests. But the most important units of the Corps, as now organized, are the two brigades of the Fleet Marine Force stationed at Quantico and San Diego. Quantico is well known for the thorough school work given officers and men. The force, which is part of the Fleet, and as such comes under the Commander-in-Chief U. S. Fleet, includes infantry, artillery, aviation, and other special units. A high state of training has been realized under the command of the Commanding General, Fleet Marine Force, with headquarters at San Diego. The Marine Corps maintains the traditional readiness of our "sea soldiers" to move on a few hours notice and to operate from either coast in the event of an emergency.

In any survey of our Navy mention must be made of the splendid morale and efficient training that now obtains. The training is as good as any in the world and the Navy does not propose to stand still. As science contributes new inventions and new technics the Navy takes full advantage of training officer and enlisted personnel in these advances. The task of educating officers and men to handle efficiently the intricate gunnery, machinery and equipment of a modern fleet is the major concern of the Bureau of Navigation in collaboration with the technical bureaus.

Searching study is given to the comfort and welfare of the men of the Navy. It is believed that our men are the best fed and best cared for of a comparable military organization in any country. We are proud of our personnel and they deserve the confidence of the citizenry.

The primary purpose of the Navy to keep the peace and defend the shores of this country involves much study as to eventualities and possibilities. Hence, the large scale maneuvers on the shores of the Pacific and in the Hawaiian area, while in 1939 the maneuvers will take place in the Atlantic with due attention to the Panama Canal. All officers must be thoroughly familiar with the defense problem of protecting our shores from a sea area that stretches from Alaska to the Hawaiian Islands and on to Samoa in the southern Pacific. Thence the vast strategic area that extends to Panama and on through to the Caribbean via Puerto Rico to the New England seaboard must receive the careful attention of planning for any and all emergencies. The United States has 3,860 miles of coastal line, the largest of any naval power. It is only by practice and strenuous exercises of all types of vessels in the fleet that officers and men may learn the problems that confront them, how to meet them and the responsibilities that may be theirs for the protection and defense of the United States. Those in authority understand the clear cut and definite mission of the Navy and every effort is being directed to gear the machine for prompt and decisive action.

The President and Commander-in-Chief gave the keynote to the general defense policy when he said:

"We as a peaceful nation, cannot and will not abandon active search for an agreement among the nations to limit armaments and end aggression. But it is clear that until such agreement is reached—and I have not given up hope of it—we are compelled to think of our own national safety."

Our Navy today thinks of our national safety for first line seaboard defense, in terms of ships, airplanes, navy yards, bases, and the all-important factor of men. We have tried limitation by treaty and limitation by example: these measures have failed. The Navy today must insure that it is of sufficient strength to prevent injury to our territory and our policies; to that end the officers, the men, and the civilian shore establishment are contributing their zealous support.

Naval Aeronautics

(*Continued from page* 47)

come such that no other navy in the world equals them. This has come about largely because of the fact that the Navy has never lost sight of the importance of research, step by step development, and the insistence on the finest training methods for its personnel. Another, and most important point which has contributed greatly to the development of a successful naval aviation is the keeping in mind of the fact that the functions of that branch are derived directly from the functions of the Navy and that all its capabilities and endeavours are directed toward the promotion of naval efficiency and are designed to enable the Navy better to perform its functions. While aircraft have not supplanted ships, they have added much to their power and effectiveness. Further, they constitute a striking force that has gone far towards increasing the value of our naval forces.

Any attempt to forecast future developments, based on past performance, would be useless; and the same applies to any attempt to forecast future limitations. With developments proceeding at such a rapid pace the only statement of the future trend of Naval Aviation which can be made, with any degree of certainty, must be based on the premise that what we consider this year to be the ultimate in material and operating technique is already being rendered obsolescent and inadequate. The Navy is constantly alert and is keeping an open mind in order to be ready to accept from the future the cue to new trends of development.

The Chemical Industry

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which is meant chemical research as well as applied chemistry, we have reason to be assured that our armed forces are today provided with protective equipment which will permit them to successfully engage in any type of gas warfare, and that, should the necessity again arise, we may be assured of seizing and retaining the offensive in gas warfare.

General Staff History

(Continued from page 39)

more durable than the genius of any single man, and must be regarded as the nursery where the commanding general can raise his principal supports, as a body of officers whose intelligence can aid his own. It not only remedies many evils, but it may safely be affirmed that it constitutes for the army the best of all safeguards. . . . It prevents the commission of faults, even though the commanding general be not wanting in experience, by furnishing him good councils."

The type of general staff outlined by Jomini and established more than a century ago continues to serve France today, with no change in concept and little change in organization. Our own general staff corresponds more nearly to the French pattern than to that of any other country.

Great Britain was much slower than her continental neighbors in establishing an army general staff. This neglect proved very costly in the Crimean War when the British Army suffered severely because of lack of proper staff preparation. Coordination was lacking, the supply system failed and hospitals were inadequate and unsanitary. Commenting bitterly on the lessons of this campaign a distinguished British officer said:

"The experience acquired from the result of the Crimean War has shown the absolute necessity of staff and supply departments being organized and trained in time of peace adequate to the wants of an army suddenly called into the field. This may be looked upon as the great result, in a practical point of view, which we derived from that hard struggle.

"It is not too much to say that an army sent into the field without efficient and thoroughly well organized and long previously trained staff and supply departments is an army fore-doomed to dogs and vultures and no expenditure at the moment, however lavish, can supply these wants or avert this doom. Our army which embarked in 1854 was a collection of magnificent isolated battalions—the finest the country ever produced—but they were bound together by a rope of sand. Irresistible on the battlefield they melted away like snow before the first touch of the hardships and inclemencies of winter."

The British profited by the experiences of the Crimean War and developed a staff system that has been gradually improved through the years. While it never attained the perfection reached by the German and French General Staffs it has served the country well and produced a number of brilliant World War commanders.

The need of a General Staff in the United States was recognized by General Washington, but it was a century and a quarter before it was established. This remarkable delay in forming a corps that in other countries had long been considered an inseparable part of a modern army was doubtless due to the fact that our peace-time army was always so small that a general staff seemed a useless and grotesque appendage. Furthermore, the so-called Indian Wars that occupied so much of the attention of our regular establishment were really a series of widely scattered engagements in which only small numbers participated. Another factor preventing a proper organization of the army in time of peace was the incurable optimism of the people. Every American generation has been engaged in a major war. Nevertheless each war has been regarded as the last. Perpetual peace seemed always assured. Hence it was considered a fantastic extravagance to prepare for a war that was never going to occur.

Most of our army officers were without accurate information concerning the organization and functions of the European general staffs. Hence, their conception of proper staff organization was restricted to their experience with the staff departments of our own army. The general staff was understood to be all of our staff departments considered collectively. Although our General Staff Corps was not established until 1903 the Adjutant General's Office in 1901 prepared a book on The Legislative History of the General Staff. The contents of the book were devoted to statutes affecting our administrative, technical and supply departments.

In 1870 Major T. M. Vincent in an excellent little brochure thus defined the staff system of our army:

"The Staff of the Army of the United States may be classified as follows:

"1. General Staff, with functions extending to the personnel and materiel of every branch, or through the whole range of service, and embracing general officers, adjutant general and assistant adjutants general, inspector general and assistant inspectors general.

"2. Special Staff (departments, corps and bureau) with duties confined to distinct branches of the service, and embracing the officers of the bureau of military justice, of the quartermaster's, subsistence, medical and pay departments, of the engineer and ordnance corps and the Chief Signal Officer."

We cannot today accept this classification. The duties of most of our general officers of the line involve those of command, not staff functions. The duties of the adjutants general and inspectors general are of a specialized and administrative nature and are not general in character. Hence, such officers should be embraced within the special staff rather than the general staff.

However, from 1775 to 1903 such distinctions were not finely drawn and when our officers spoke of a general staff they usually meant the expression to include all of the prinicpal staff officers of the army.

Before the War of Independence each colony maintained a militia for use in defense against Indian depredations. In some of the colonies the militia was developed to a state of considerable efficiency and it frequently took the field for relatively long periods. However, no staff organization was developed. The organizations were seldom far from home and the supply problem was rarely serious.

The beginnings of what was to be our War Department came with the assembly of the Second Continental Congress in 1775. Committees were appointed to deal with fortifications, ordnance and the organization and discipline of a military force. On June 16, 1775, George Washington was appointed to command the army, though at the moment a continental army existed only in the minds of some of the members of Congress.

On the same day that Washington was named commander-in-chief the Congress authorized the appointment of an Adjutant General, a Quartermaster General, a Commissary General of Stores and Provisions, a Paymaster General, a Chief Engineer and a Commissary General of Musters. Later, other staff officers were added, such as an Inspector General, a Judge Advocate, a Chief Physician, a Commissary of Artillery, a Commissary General of Prisoners, a Commissary of Horses and Wagons and a Commissary of Forage. Procurement of supplies was handled to a considerable extent by agencies not directly connected with the army. Civilians at various times occupied such positions as clothier general, a commissary general of purchases, a commissary general of issues and a commissary of hides.

Under Congressional guidance our Revolutionary Army found it almost impossible to function. Numerous committees were appointed and resolutions were adopted, but the Congress was without authority to enforce its decisions. It was a revolutionary body dependent on the colonies for sanctions and the local governors and legislatures were unwilling to concede broad powers to the Congress.

Washington took command of about 17,000 militia and irregular volunteers. Enlistment terms expired before recruits had sufficient training to enable them to compete, on anywhere near equal terms, with the British veterans. Such staff as was formed was based on knowledge of the British staff. During the War Washington continually spoke of the great handicap occasioned by the lack of an efficient staff.

During the terrible winter of 1777 and 1778 when Washington's little army was in such a pitiful state at Valley Forge the supply system largely broke down and it was with great difficulty that either food or clothing was furnished the suffering soldiers in quantities sufficient to enable them to survive. From these distressing experiences there arose a more efficient staff organization. The supply departments were completely reorganized and at last began to function satisfactorily. Efforts of that colorful character, Baron Von Steuben, to install order and discipline into the army began to bring results. Henceforth to the end of the war the staff system, though leaving much to be desired, compared favorably with that of the British.

Following the Revolutionary War the Congress ignored Washington's advice and decided to dispense with a standing army, except for eighty soldiers retained to guard public stores. Actually, larger numbers were kept under arms because of Indian troubles. However, the staff organization of such an army was of little consequence. Purchases were transferred to the treasury and the staff bureaus of the War Department had little to do. In 1797 Congress created what was termed a General Staff, consisting of the Brigadier General, Commanding the Army, the Quartermaster General, and the Judge Advocate General. Subsequent legislative references to the General Staff were clearly applicable to the administrative, technical and supply staffs and not to a General Staff Corps.

In 1798, when a war with France seemed imminent, Washington was designated to command our army with the rank of lieutenant general. He immediately was impressed with the need of a staff organization and wrote to Mr. McHenry, Secretary of War, on the importance of careful selection of general staff officers—having in mind probably all staff officers whose duties were of a general nature. He said:

"To remark to a military man how all-important the general staff of an army is to its well-being and how essential consequently to the commander-in-chief, seems to be unnecessary; and yet a good choice is of such immense consequence that I must be allowed to observe that they ought to be men of the most respectable character and of first-rate abilities, because from the important nature of their respective offices . . . scarcely any movement can take place without their knowledge. It follows then that . . . they ought to have qualifications of integrity and prudence in an eminent degree, that entire confidence might be reposed in them."

The war clouds were dissipated without Washington ever assuming command of the army of 12,000 that had been authorized. However, the statement of Washington as to the qualifications of general staff officers still holds good.

From 1796 to 1812 various staff positions were created by Congress. These included Inspector General, Adjutant General, Physician General, Apothecary General, Paymaster General, Quartermaster General and Commissary General of Ordnance. From these offices there grew up through the years various staff departments and bureaus that had a marked influence on the subsequent administration of the War Department in peace and war. In the early years of their existence, however, these staff officers were of small importance and their activities were restricted to the nominal administration of a tiny army and a small number of militiamen on active duty.

At the outbreak of the War of 1812 the staff reorganization of the army, largely in neglect, was hurriedly begun. Under such circumstances it was certain that our hastily raised army would be without cohesion and coordination, that its lack of organization and training would invite disaster. During the War of 1812 the total American land forces amounted to approximately 500,000 men. They were employed against a maximum of 67,000 British regulars, yet the English captured Washington and burned the public buildings. The only important land victory of the Americans was at New Orleans after the treaty of peace had been signed.

In this connection Secretary of War Crawford in a communication to Congress in 1815 said:

"The experience . . . of the last war . . . has incontestably established not only the expediency but the necessity of giving the military establishment in peace time the organization which it must have to render it efficient in a state of war. It is believed to be demonstrable that a complete organization of the staff will contribute as much to the economy of the establishment as to its efficiency."

Three years later Mr. John C. Calhoun, then Secretary of War, said:

"No part of our military organization requires more attention in peace than the general staff. . . . If negiected in peace, when there is leisure, it will be impossible in the midst of the hurry and bustle of war, to bring it to perfection. In this country, particularly, the staff cannot be neglected with impunity."

As a result of the statements of these two Secretaries of War the staff departments were reorganized first in 1816 and again in 1818. They functioned fairly satisfactorily in the Indian Wars and during the War with Mexico, in spite of the fact that the troops were often long distances from supply depots and operating in hostile territory.

The War between the States presented to our staff officers their greatest problem in our history. At first there was great confusion. Untrained troops were hurried into battle without coordination and with inadequate provision for supplies. If initial difficulties due to faulty staff work on the Union side had been overcome the war undoubtedly would have been much shorter. The intelligence service was particularly poor. Wild rumors of impossible Confederate troop concentrations were given official credence. Toward the close of the war the Union staff functioned well and coordinated movements of widely separated armies finally brought victory. Supply of troops was greatly improved and for the first time in history railway transportation was extensively utilized for the movement and supply of troops in war.

From 1818 to 1903 there grew up in the War Department a system of staff bureaus, politically powerful, and largely independent of the line of the army. The chiefs of these departments were usually very able men of great influence with the Secretary of War and members of Congress. The permanence of their positions gave them power and influence out of proportion to the importance of their positions. For example General Jessup was Quartermaster General from 1818 to 1860 and General Gibson Commissary General from 1818 to 1861. General Meigs served as Quartermaster General for more than 21 years, from 1860 to 1882.

Between the bureau chiefs and the nominal commanding general of the army there developed inevitable friction. When Grant became President he assigned General Sherman to command the army. On assuming command he named the bureau chiefs of the War Department as members of his staff. This order definitely made the permanent heads of the staff departments subordinate to the commanding general. This was entirely logical but it served only to increase the friction and in a few weeks Secretary of War Rawlins directed Sherman to revoke the order. Thoroughly disgusted, General Sherman moved the headquarters of the army to St. Louis, leaving the bureau chiefs in undisputed control in Washington.

Friction between the commanding general of the army and the bureau chiefs was almost continuous from then until 1903. A notable exception occurred during the period when Lieutenant General J. M. Schofield was Commanding General. It was General Schofield who first declared that the senior officer of the army should be Chief of Staff, not Commanding General. He said:

"The proper position for the senior officer of the army on duty in Washington is not that of commanding general . . . but that of general in chief, which means in fact chief of staff to the President."

During the seven years that General Schofield occupied that position he conducted his office as though he were in name as well as in fact Chief of Staff of the Army under the Secretary of War and the President. The result was harmonious relations with all branches of the War Department.

As early as 1875 General Emory Upton laid his finger on the cause of the friction and disorganizaton within the War Department. General Upton was one of three army officers who had been sent to Europe to study the organization of foreign armies. On his return he wrote a brilliant report outlining the military history of the United States and discussing in detail the military operations of our army. He criticised the peace organization of the War Department and pointed to the remedies. With reference to the growth of the power and influence of the heads of the staff bureaus General Upton said:

"Instead of acknowledging the general in chief, under the President, as the military head of the army the chiefs of staff corps have magnified the duties of Secretary of War and have preferred to look to him, not

only as the chief of administration, but as their sole and legitimate military superior. Under his protection they have to a large degree withdrawn the operations of their departments from the control, and even inspection, of the general in chief and other military commanders. The Ordnance, for example, manufactures our guns and carriages; the Engineers build the fortifications on which the guns are mounted, and both are turned over to the army to be tested in war without an opportunity having been given for the general in chief, or the officers who die in their defense, to make the slightest suggestion."

Unfortunately little attention was paid to the report of General Upton at the time. A generation later Elihu Root, who became Secretary of War in 1899, resurrected it and had it published. Mr. Root obtained a manuscript copy of the report from Colonel Henry A. Dupont of Delaware. This report formed a basis for the organization of the army and for the creation of the General Staff Corps. It has exercised a profound influence on our military policy ever since its publication.

Elihu Root became Secretary of War within a year after the close of the War with Spain. That contest had served as a glaring illustration of the evils of the peace-time organization of the Army and of the War Department. Though Spain and Cuba had been fighting for years at our very doorstep and the possibility of our becoming involved in the struggle was recognized, we had made little or no preparation for war. There was great confusion in the War Department and in the field. Had we been confronted by a more formidable foe the result would have been disastrous.

General Miles, Commanding General of the Army, took the field, commanding a force that was sent to occupy Puerto Rico. General Shafter was sent to Cuba. The direction of the war centered in Washington, nominally in the Secretary of War, but actually in Adjutant General Corbin. General Corbin was an energetic, capable officer but without a proper staff organization and without carefully prepared plans his task was colossal. The supply system was inadequate. Unsanitary camp conditions proved more deadly than Spanish bullets.

Referring to the situation in Washington, General W. H. Carter wrote:

"At the outbreak of the War with Spain the conditions in the War Department indicated to every thoughtful officer who had given any study to the subject the absolute necessity for a General Staff. From the moment that it became apparent that a volunteer army was to be raised and that there was to be an increase in the Regular Army the offices of the Secretary of War and the Adjutant General and Assistant Adjutants General, and the corridors of the War Department were uncomfortably crowded with applicants for appointments or with members of Congress presenting the claims of constituents for appointment to office. The Secretary of War and the Adjutant General could only attend to the proper functions of their offices in guiding organization, equipment, and mobilization of the great volunteer army then being put in the field by secreting themselves for a few moments at a time, or during the night, when most of the real business of the department had to be conducted. . . . The system of centralization of authority had been carried to such an extreme for many years that the department was forced to attempt to run everything from Washington."

In other words the War Department was geared to the peace-time administration and supply of the army and the sudden expansion due to war and the necessity for speeding up the processes of mobilization, supply and movement of troops caused a shock that complacent bureaucracy could scarcely withstand. There were practically no plans and no machinery to care for the increased activities. There was no group whose principal duty it was to prepare for just such a contingency. It was a miracle that the Department could function at all under the sudden strain of war.

When Mr. Root became head of the department the War with Spain had been concluded but the annoying Philippine Insurrection was in progress on the other side of the world. The orderly mind of the new Secretary quickly perceived the difficulties that had beset the department and he set about to provide a permanent remedy. His annual report for 1899, written only a few months after he assumed office, goes right to the heart of the trouble. He said:

"It seems to me that the best course would be to settle upon the true principle which should govern the use to be made of the army and then inquire in what respect our present arrangement fails to conform to that principle, and make it conform.

"Two propositions seem to me fundamental in the consideration of the subject:

"First. That the real object of having an army is to provide for war.

"Second. That the regular establishment in the United States will probably never be by itself the whole machine with which any war will be fought.

"The first of these statements reads like a truism. . . . Yet the precise contrary is really the theory upon which the entire treatment of our army proceeded for the thirty-three years between the civil war and the War with Spain. Present utility was really the controlling consideration, and the possibility of war seemed at all times so vague and unreal that it had no formative power in shaping legislation regarding the army. . . .

"The preparation of an army for war involves at least these four things:

"First, systematic study by responsible officers of plans for action under all contingencies of possible conflict, and with this, study of the larger problems of military science and the most complete information of the state of the art, study of the constant improvements in implements and methods of warfare, and the adaptability of improvements and inventions for the purpose of carrying out the plans devised, and study of the arrangement of territorial and tactical organizations, and the establishment of depots, camps, fortifications and lines of communication with reference to these plans, so that all expenditures for each separate step of development may contribute toward the practical realization of a comprehensive and consistent scheme. This requirement is not to be met by the separate study and reflection of single officers not charged with the duty or able to give effect to their conclusions. The responsibility of declared duty, the comparison of different views, the contribution of different minds, the correction and evolution of discussion, the long-continued, laborious and systematic application of a considerable number of minds of a high order, and with a recognized status giving authority to their conclusions, are needed to produce the desired result. . . .

"Second. The preparation of material of war, keeping pace with the progress of military science and adapted to the conditions to be anticipated when war shall arise. . . . Some body of competent men whose business it is to be familiar with the whole field of invention, to consider it, to discuss it, and to reach conclusions upon it, alone can furnish those authoritative determinations which are necessary to effective demands for adequate material.

"Third. An adequate process of selection according to merit and effectiveness among the officers of the army, so that the men of superior ability and power may be known

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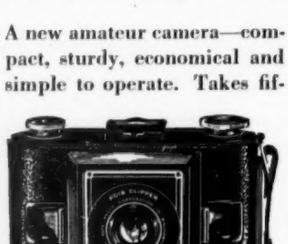

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and placed in positions involving responsibility and authority. . . .

"Fourth. The exercise and training of the officers and men of the army in the movements of large bodies of troops by brigade, division and corps under conditions approaching as nearly as possible those to be anticipated in executing the plans devised for their action in war. . . ."

In furtherance of these propositions the Secretary of War advocated the establishment of an Army War College, the instruction of all officers in the application of military science to national defense, that all staff appointments, other than medical, be made by detail from the line for periods of four or five years and that promotion be made both by seniority and selection. He also recommended greater cooperation of the army and navy, the appointment of a Chief of Artillery, and an increase in the number of inspectors general and in the number of cadets at the Military Academy.

The Secretary, on February 19, 1900, appointed a board of officers to consider the establishment of the Army War College. The board was composed of Brigadier General William Ludlow, Colonel Henry C. Hasbrouck and Lieutenant Colonel William H. Carter. Later Lieutenant Colonel Joseph P. Sanger was added to the board. Colonel Carter also served in a confidential capacity as an unofficial adviser to the Secretary of War. He has left us an interesting and informative personal narrative of his service in this connection. Various details of the problem were assigned to different members of the board for special study. General Ludlow visited Europe and studied the organization of foreign armies. To Colonel Carter was assigned the study of service schools and of a general staff for the army. Without waiting for the report of the board, Secretary Root succeeded in procuring from Congress an appropriation of $20,000 for the establishment of the Army War College.

On October 31, 1900, the board submitted its report together with a draft of an executive order establishing the War College. The report of the board also contained the following recommendation:

"The board, therefore, while convinced that the War College, if established and consistently sustained, can be made to effect valuable results, specially urges the necessary legislative provision for a General Staff, on thoroughly considered and effective lines, be recommended for incorporation in the military service of the United States at the earliest possible time as a permanent feature of the organization of the army."

Previously, General Ludlow from Europe had filed a separate report in which he said:

"All services, with the exception of our own and possibly the English, although they have nominal provision for it, include the organization of a General Staff. . . .

"It is believed that this service is indispensable and that provision should be made for carefully training a sufficient number of officers for assignment to the General Staff service. This would involve the taking of the honor graduates of the service schools, or others specially distinguished, providing for their advanced instruction in staff and general military duty, and their assignment to the General Staff, with the requirement that at stated intervals they should go back again to duty with their regimental or other commands. The feature of interchangeability is regarded as essential, in order that the staff should not lose touch with the line or forget that their first duty is to be soldiers and their second, that their service shall be subordinate and bear direct relation to service conditions and the operations of troops in the field.

"For this reason the candidate for General Staff service should have the opportunity to familiarize himself with all the details of the higher military administration, as well as those of the several arms, the study of military history and campaigns, the preparation of material to constitute the basis for possible future campaigns, and to work out in detail and advance every military requirement, to be at the service of the generals commanding and of the War Department when necessary.

"It would be nearly useless to provide for the higher instruction of officers of the line beyond the requirements of their special arm unless there shall be some specifically designated field of duty in which their acquired knowledge and experience can be utilized, and it is also evident that a trained and competent staff is essential to the conduct of field operations and, antecedent thereto, to the direction of military education and instruction, to the planning of campaigns, and proper provision for the equipment, mobilization and concentration of troops, whether for hostile operations or training maneuvers."

Continuing, General Ludlow recommended that the War Department General Staff be divided into three sections, one devoted to personnel and war plans, another to training, transport and statistics, and the third to military intelligence and education. He also urged a comparable general staff organization for each military department and division. General Ludlow, who died within a year of making this report, seems to have visualized an organiaztion closely approximating our present General Staff Corps.

General Malin Craig
Chief of Staff, United States Army

Despite the strong recommendations for the creation of a General Staff Corps no provision for its establishment was made in the Act of 1901 reorganizing the army. This law did provide, however, for abolishing permanent appointments in the various staff departments and for the substitution of the detail system. In November, 1901, a general order was issued coordinating the system of military instruction. It classified the Artillery School, the Engineer School, the School of Submarine Defense, the Cavalry and Field Artillery School and the Army Medical School as special service schools. It then provided for a General Service and Staff College at Fort Leavenworth and the War College at Washington.

In the meantime Colonel Carter prepared several memoranda for the Secretary of War urging the establishment of a General Staff Corps. In his Annual Reports of 1901 and 1902 Secretary Root recommended the creation of a General Staff.

At the direction of the Secretary, Colonel Carter prepared a bill which was introduced in Congress on February 14, 1902. In addition to providing for a General Staff it also contained a number of other features, the most important of which was one which proposed to merge the Quartermaster's Subsistence and Pay Departments in a Department of Supply. The bill authorized the President to detail officers from the army at large to the General Staff Corps, the duties of which were "to consider the military policy of the country and prepare comprehensive plans for the national defense, and for the mobilization of the military forces in times of war; to consider and report upon all questions affecting the welfare and efficiency of the army . . . to devise means for the cooperation of the military and naval forces of the United States, with a view to harmonious action in time of war; . . . and to serve as an agency through which all means of military information shall be at any time at the disposal of the War Department." Duties then prescribed by law for the Commanding General of the Army were transferred to the General Staff.

The bill provided that the Inspector General's Department be abolished and the functions of that department taken over by the General Staff, except the inspection of money accounts which were to be transferred to the Treasury.

It prescribed that the new General Staff should consist of one Chief of Staff with the rank of lieutenant general, and 36 other officers of various grades, all to serve for a period of four years.

In a communication to Congress supporting the bill, Secretary Root said that it was proposed to designate Lieutenant General Nelson A. Miles as the first Chief of Staff. General Miles, who had never been sympathetic with the proposal to create the General Staff made an unexpected appearance before the Senate Military Affairs Committee in vigorous opposition to the bill. He said:

"More than 100 years ago our army was organized by the genius of Washington, Steuben and Hamilton and others. In all the wars in which we have been engaged it has in the end been victorious. It has withstood intrigue and contaminating influences from without and has absorbed the injurious elements that have been forced into it, sustaining the honor of the nation and the glory of American arms in every campaign, and its present organization is best adapted to our great republic.

"In my judgment a system that is the fruit of the best thought of the most eminent patriots and ablest military men that this country has produced should not be destroyed by substituting one that is more adapted to the monarchies of the old world. . . .

"The scheme is revolutionary, casts to the winds the lessons of experience, and abandons methods which successfully carried us through the most memorable epochs of our history.

"In fact the general's authority for initiative is taken away, and he can make no move without the direction or sanction of the all-powerful General Staff which, under the bill, is only subject to the control of the Secretary of War, whose knowledge of affairs military may be meager or nil. . . .

"As every member of this committee has had experience in actual warfare, I trust that the office which Scott and Grant and Sherman held with so much distinction will not be destroyed while any of their comrades and friends who so well knew of their services and responsibilities still survive."

The opposition of General Miles was sufficient to destroy all chance of favorable action on the bill at that session. At the December session of Congress a new bill was introduced, limited to the creation of the General Staff. This bill was strongly supported by Major General S. B. M. Young, President of the Army War College, Major General Henry C. Corbin, The Adjutant General, Brigadier General George W. Davis, and other prominent army officers.

The bill as finally passed created a General Staff Corps and prescribed its duties as "to prepare plans for the national defense and for the mobilization of the military forces in time of war; to investigate and report upon all questions affecting the efficiency of the army and its state of preparation for military operations; to render professional aid and assistance to the Secretary of War and to general officers and other superior commanders, and to act as their agents in informing and coordinating the action of all the different officers who are subject . . . to the supervision of the Chief of Staff; and to perform such other military duties not otherwise assigned by law as may be from time to time prescribed by the President."

The law provided that the General Staff should consist of a Chief of Staff and 44 other officers, each detailed from the army at large for a period of four years and not eligible for a further detail, except in time of war, until he had served two years in the branch in which he held his permanent commission. The Chief of Staff was given supervision over all troops of the line and over the staff departments. At the last minute the Congress added a section making the Chief of Artillery an additional member of the General Staff.

The new law was approved by President Theodore Roosevelt on February 14, 1903. The pen with which the act was signed was presented to Colonel W. H. Carter and by him sent to the library at the United States Military Academy at West Point.

Out of deference to General Miles the act specified that it would not become effective until August 15, 1903. General Miles retired for age on August 8. Thus the general who objected so strenuously to the creation of the General Staff was spared what he doubtless would have considered the humiliation of being an official party to its establishment. Lieutenant General S. B. M. Young succeeded General Miles in command of the army on August 9, and a week later became the first Chief of Staff.

It will be noted that the law as finally passed omitted the provision that the General Staff should take over the functions of the Inspector General's Department. This was an excellent omission. Had it remained in the law General Staff officers would probably have found themselves fully occupied with routine and special inspections and investigations, leaving them little time for broader studies of the problem of preparing for the exigencies of war. However, the last-minute inclusion of the Chief of Artillery as a member of the General Staff was an example of faulty organization. It was a recognition of the importance of the recently created Artillery Bureau, but it served only to emphasize the subordination of the other bureau chiefs.

By direction of the President a board of officers was appointed to recommend officers to serve as the initial members of the General Staff Corps. The board omitted from its list the Chief of Staff and the Assistant Chiefs of Staff, confining its recommendations to 42 officers below the rank of general officer. The recommendations of the board were approved and the detail of these officers was announced in General Orders on April 17, 1903. On June 20, 1903, General Young was designated as Chief of Staff with Major General Henry C. Corbin, Brigadier General William H. Carter and Brigadier General Wallace F. Randolph, Chief of Artillery, as Assistant Chiefs of Staff. Among those who served as the first members of the General Staff were several who subsequently gained out-

standing distinction. Among them were Major George W. Goethals, Captain John J. Pershing, Captain Peyton C. March and Captain Joseph T. Dickman. General Carter remained on the General Staff only about six months, being sent in December, 1903, to England and France to make certain military studies before proceeding to his new station in the Philippines.

Elihu Root ceased to be Secretary of War on February 1, 1904. In his final report he outlined the events leading up to the establishment of the General Staff and the reasons for its creation. His successor, William Howard Taft, in his report for 1904 said:

"I strongly approve the institution of the General Staff. Its work for one year demonstrates its utility. Experience will doubtless suggest useful changes in the details of its operations, and a somewhat more exact definition of its jurisdiction, but no one at all familiar with its advantages will ever think of recommending its abolition."

The initial organization of the General Staff divided its work among three divisions. The first division concerned itself with the organization, administration and equipment of the mobile army. The second division had charge of the collection and dissemination of military information. The third division had charge of war plans, military education and seacoast defenses. In 1908, when Major General J. Franklin Bell was Chief of Staff the second and third divisions were combined. In 1910 Major General Leonard Wood, then Chief of Staff reorganized the General Staff into three divisions, the first or mobile Army division, the second or War College Division, handling military information and education, and war plans, and the third or Coast Artillery Division. Later a fourth division of Militia Affairs was added.

From 1903 to 1916 the General Staff Corps functioned with varying degrees of success. It was a great improvement over previous War Department organization but considerable time elapsed before it gained the universal acclaim of the line and staff. In the first place its principal role of defining policies and perfecting plans for national defense seems to have been subordinated to routine administration of the army and supervision over the normal operations of the supply departments. Military affairs were still largely centralized in Washington and territorial commanders lacked authority for the proper administration of their commands. Bureau chiefs, long accustomed to almost complete independence, chafed under real or fancied restraint. As a result of this lack of confidence the prestige of the new corps suffered.

In 1906 the General Staff was called upon to supervise the dispatch of an expeditionary force to Cuba. That it did its work well is attested by the report of Secretary of War William Howard Taft, who said:

"The work of the General Staff incident to the recent dispatch of the expeditionary force to Cuba was done with such precision, such absence of all friction and such completeness as in itself to justify the existence of this necessary instrumentality for the administration of army affairs, now entering upon the fourth year of its successful operation."

Latent opposition of the bureau chiefs to the General Staff became acute in 1910, with an open clash between Major General Leonard Wood, the Chief of Staff, and Major General Fred H. Ainsworth. Both were men of very positive personalities and their differences were difficult to adjust or compromise. For a time it appeared that General Ainsworth would be tried by court martial for insubordination, but the matter was finally adjusted with his retirement from active service.

The friction between the bureau chiefs and the General Staff was increased rather than lessened by the termination of this incident. Finally, in the National Defense Act of June 3, 1916 the Congress attempted to curtail the authority of the General Staff by abolishing the Mobile Army and the Coast Artillery Divisions and prescribing that:

"The business heretofore transacted in said divisions, except such as comes clearly within the general powers specified in and conferred upon members of the General Staff Corps by the organic act of Congress approved February 14, 1903, is hereby transferred as follows, to wit:

"To the office of Chief of Coast Artillery, all business apportioned to that office by law or Army Regulations at the time of the creation of the Coast Artillery Division of the Office of the Chief of Staff; to the office of The Adjutant General, or other bureau or bureaus concerned, all other business; and subject to the exercising of the supervising, coordinating and informing powers conferred upon members of the General Staff by Act of Congress . . . the business transferred by this proviso to certain bureaus or offices shall hereafter be transacted **exclusively** by or under the direction of the respective heads thereof. . . ."

This act also provided that the members of the General Staff should be

"**Exclusively** employed in the study of military problems, the preparation of plans for the national defense and the utilization of the military forces in time of war, in investigating and reporting upon the efficiency and state of preparedness of such forces for service in peace or war or on appropriate General Staff duties in connection with troops, including the National Guard, or as military attaches in foreign countries, or on other duties, **not of an administrative nature,** on which they can be lawfully and properly employed . . . and they shall not be permitted to assume or engage in work of an administrative nature that pertains to established bureaus or offices of the War Department. . . ."

This enactment appeared greatly to handicap the work of the General Staff and to restore to the bureau chiefs practically all of the power and authority of which they had been deprived during the thirteen years the General Staff had been in existence. This view was given great authority by an opinion of Brigadier General Enoch Crowder, The Judge Advocate General of the Army, who held:

"Under the statute the jurisdiction of the Chief of Staff does not absorb that of the several bureaus, nor subject their action or their views upon particular matters falling within their special jurisdiction to his review and modifying judgment, but his function is limited to general supervision, going no farther than to secure by the exercise of general power under the direction of the Secretary of War harmonious cooperation and successful general results. . . . In all matters falling within the special jurisdiction of the several bureaus Congress has said, in effect, that the views of the particular bureau chiefs shall govern the Secretary of War. . . ."

Coming almost on the eve of our entry into the greatest war of our history this opinion of the Judge Advocate General of the Army, if approved, would appear to deprive the Chief of Staff of practically all authority over the bureaus of the War Department and to reduce his functions to that of a mediator and adviser, with no administrative functions commensurate with his responsibility in preparing the army for war. Fortunately the view of the Judge Advocate General did not prevail. Secretary of War Newton D. Baker, who had been in office only a few months devoted his fine legal talents to a detailed study of the question. In a comprehensive outline of the history of the General Staff he reviewed the Act of 1903 creating the General Staff Corps and concluded:

"If the act means anything it means that in large and general terms the Chief of Staff . . . has supervision of the corps, bureaus and departments, therein enumerated, and the large and generous terms employed indicate the plain intention of Congress to empower the Chief of Staff to stand in the relation of military aide and adviser to the Secretary of War, and, acting in his name, so to direct the activities of the heads of bureaus and sub-departments as to coordinate and harmonize their activities. . . .

"It is fair to assume that Congress did not intend to inaugurate a race for power among bureau chiefs or to erect the bureaus of the War Department into a system of coordinated impediments to one another. . . .

"The policy of the War Department, therefore, will remain as heretofore. The Chief of Staff, speaking in the name of the Secretary of War, will coordinate and supervise the various bureaus, offices and departments of the War Department. He will inform himself in as great detail as in his judgment seems necessary to qualify him adequately to advise the Secretary of War."

An unsigned memorandum, probably written by Major General Hugh L. Scott, then Chief of Staff, was found among the papers of Secretary Baker. It said:

"It is not amiss to say that the decision of the Secretary of War in this matter marks as important an epoch in the history of the army as was the creation of the General Staff by Secretary of War Root. It should mark the last attack by agencies of the War Department upon the General Staff Corps in defense of what has hitherto been considered their vested rights."

The decision of the Secretary of War to preserve the authority of the Chief of Staff was made in September, 1916. Within scarcely more than a half-year we were plunged into war. The task of raising, equipping, training and transporting our armies was extremely difficult at best. How much worse would the situation have been if the General Staff had been rendered impotent by the narrow construction of a restrictive statute?

Our General Staff Corps had not been tested in a major war. There had been a small expedition to Vera Cruz, a troop concentration on the southern border and a punitive expedition into Mexico. From these experiences our army had learned much that was to prove of inestimable value in 1917 and 1918. However, none of these episodes had really tested our organization. Most of our officers had an inadequate conception of the manifold problems confronting a commander in the field in a struggle of the magnitude of the World War. Everyone now knew, of course, that a well-organized staff in the War Department and in the field was essential to success. However, ideas as to the details of such an organization were at best decidedly nebulous.

The selection of General Pershing to command our expeditionary force was a stroke of genius. His long field service, his studies and observations of foreign armies, his knowledge of the science of war and his talent for leadership ideally fitted him for the colossal task. At the time of his selection on May 2, 1917, he was in command of the Southern Department with headquarters at Fort Sam Houston, Texas. He arrived in Washington on May 10 and in less than three weeks had assembled his staff and sailed for France. In his original staff of 31 officers were three General Staff officers. They were Major James G. Harbord, Chief of Staff of the Expeditionary Force, and Major John McA. Palmer and Major Dennis E. Nolan, assistants. The small group that was to establish American headquarters in France sailed from New York on the Baltic on May 28. Included in the party were 40 Regular Army officers, 17 Reserve officers, 2 Marine Corps officers, 67 enlisted men, 36 field clerks, 20 civilian clerks, 3 interpreters and 3 newspaper correspondents. After a week in England the party went to France and established headquarters in Paris. American military observers already in France became a part of the new headquarters. This military mission was composed of Major James A. Logan, Lieutenant Colonel James R. Church, Major Frank Parker, Major John W. Barker, Major William Mitchell, and Major Marborough Churchill.

Among the first duties of the new headquarters staff were to study the organization and disposition of the French and British armies and to establish policies to govern the administration and operations of the American troops which were to come to France in the ensuing months. General Pershing and Major Harbord made a detailed study of the General Headquarters organizations of the French and British armies. Boards of officers were formed to study ports of debarkation and sites for training camps.

On July 5, 1917, General Pershing issued an order establishing a General Staff of three sections. Lieutenant Colonel Harbord was named as Chief of Staff, Major Logan headed the administrative section, Major Nolan was Chief of the Military Intelligence Section and Lieutenant Colonel Palmer became head of the Operations Section. On August 11 a Coordination Section and a Training Section were added to the General Staff with Lieutenant Colonel William D. Connor heading the former and Lieutenant Colonel Paul B. Malone the latter. On September 1, General Pershing moved his headquarters to Chaumont. About the same time Major Frank R. McCoy was appointed Secretary of the General Staff. In January, 1918, General Tasker H. Bliss arrived from Washington to become the American Member of the Allied War Council.

A general reorganization of the General Staff and of the supply and technical staff was announced on February 16. In this order the now familiar terms G-1, G-2, G-3, etc. first appear. No change in the functions of the various sections was made at that time, but provision was made for a Deputy Chief of Staff and the supply and technical staff departments were grouped under a single command in the Service of the Rear, soon to be known as the Service of Supply. Colonel LeRoy Eltinge became the first Deputy Chief of Staff and Major General Francis J. Kernan who previously had charge of the Line of Communications took command of the Service of the Rear, with headquarters at Tours. Later the Coordination Section, G-4, became the Supply Section of the General Staff. With only slight changes this staff organization continued for the remainder of the War, functioning with conspicuous success in all of the major campaigns of the final year of the World War.

The organization of the staffs of the divisions, corps and armies of the A. E. F. followed closely that of General Headquarters. For the conduct of active operations in the field as well as for expediting the tremendous work of the General Headquarters the staff system devised by General Pershing was almost an ideal arrangement. It took over much of the detailed headquarters work, so tremendous in a modern army, leaving the commander free to study the larger aspects of the military operations, and permitting him to make vital decisions unfettered by routine supervision of administrative details.

General Pershing's policy was to rotate his General Staff officers between his headquarters and field commands. This change in important headquarters assignments handicapped him to some extent, but this disadvantage was offset by making available for duty as troop commanders some of the ablest and most brilliant leaders of our army. A conspicuous exception to his policy of rotation was General Dennis E. Nolan who served with great distinction as head of the Military Intelligence Section of the General Staff at General Headquarters throughout the entire period of the War. However, General Nolan found time while on a short leave to go to the front and take command of a brigade in action, winning the Distinguished Service Cross for conspicuous heroism during this brief period.

General Harbord was relieved as Chief of Staff early in 1918 and commanded with great success the Second Division at Belleau Wood and in other front-line operations. Later he reorganized and commanded the Service of Supply. Among others of the General Staff at General Pershing's headquarters who later won their laurels on the battlefield were General McCoy, General Fox Conner, General W. D. Connor and General Paul B. Malone. At the time of the Armistice 250

(*Continued on page* 126)

OUR COVER

Readers of this Anniversary Number of the ARMY AND NAVY JOURNAL will be interested in the special design for the cover.

The symbolic diamond for the 75th Anniversary tops the page. In the center is the traditional "mast head" in the design which has marked the ARMY AND NAVY JOURNAL since its first issue. The bottom third is in the spirit to which the issue is dedicated—the forces of industry supporting the forces of defense.

Over all are the national colors. The blue was placed at the top because, in spite of the generally used term "red, white and blue," heraldry experts are in agreement that the blue is the "honor" color. On the flag it occupies the position of honor; that is, to the top and next to the staff. This is exemplified in the official "Flag Circular" issued by The Adjutant General's Office of the War Department which decrees:

"Bunting of blue, white, and red should be used for * * * decoration in general. Bunting should be arranged with the blue above, the white in the middle, and the red below."

Surface Vessels of the Navy

(*Continued from page 85*)

ship, the cruiser is a ship of high speed that has excellent maneuvering ability, long cruising radius, and considerable offensive strength. To attain those qualities, the inherent defensive strength and the invulnerability of the battleship must be sacrificed. In other words, under most conditions, a cruiser must protect itself by its speed rather than by its armor.

"The duties cruisers are called on to perform are much more numerous and varied than are those required of battleships. The long steaming radius, great maneuverability, high speed and heavy hitting power of cruisers make them particularly adaptable for any duty that requires the utilization of such characteristics. Thus cruisers have become known as 'the wolves of the sea.' Whether they act singly or in packs this analogy stands correct."

Aircraft Carriers

The late Rear Adm. John Halligan, USN, at that time Commander, Aircraft, United States Fleet, wrote as follows on the use of aircraft carriers and aviation with the Fleet:

"Fleet aviation is in four categories—the carrier based squadrons comprising scouts, fighters, bombers and torpedo planes; the cruiser and battleship seaplanes for scouting and gunnery observation; the big flying boats of the patrol squadrons; and the airship Macon. The latter is on trial to determine her value to the Fleet.

"In heavier-than-air, progress is being made in procurement of improved types of planes, in methods of training and in the extent of operations. The air arm has become an integral part which contributes greatly to the security and to the striking power of the Fleet. There is an intelligent and sympathetic appreciation of the power and limitations of aviation by those in high command.

"Ours is a specialized form of flying which requires an intimate knowledge of the sea, of naval vessels and of naval tactics. For this a basic naval training is essential. The present satisfactory status of Fleet aviation is due primarily to the fact that our pilots are officers and men who have come into aviation from the Fleet. When their flying days are over those not required for aviation administration will go back to the general naval service. Their loyalty is to the Fleet. We are fortunate in not having had to develop our naval air arm under the handicap of a united air force."

Destroyers

An article published at the same time said of the destroyer:

"Now with the addition of a number of new scout cruisers, the destroyer has been dropped back into its more natural position of a screen for the Fleet. The destroyer force can now in full strength carry on its principal role of launching torpedo attacks against the enemy's battleships. In this task, because of their speed, size and relative invisibility, destroyers are a constant danger to the enemy fleet.

"Defensively the destroyers' role is to break up an attack by enemy destroyers, to keep them from getting close enough to the line of battleships to launch their torpedoes. They also protect the battleships from submarines. The deadly depth charges carried by the destroyers will keep enemy under-sea craft from coming to the surface to send its torpedoes against the battleships.

"The torpedo is the weapon of the destroyer, although it carries four and five-inch guns, and depth charges. While there are a few of the newer cruisers of the world's navies which have higher speed, generally speaking the destroyer is the fastest of ships. Its engines have as much horsepower as battleships."

In addition to these combatant vessels, the train of the Fleet includes destroyer tenders, submarine tenders, large and small seaplane tenders, repair ships, mine sweepers, Fleet tugs, survey ships, hospital ships, oilers, and store ships.

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General Staff History

(*Continued from page* 124)

officers were serving as members of the General Staff in France. When it is remembered that more than 2,000,000 American soldiers were in the A. E. F. at that time the number of General Staff officers engaged in planning and organizing the conduct of operations and in coordinating the work of the administrative, technical and supply staff seems remarkably small.

To supply the need for trained officers a General Staff College was established at Langres in November, 1917 and functioned throughout the War. The college graduated 537 officers.

It is worthy of note that in the A. E. F. there was no counterpart of the long-standing friction between the General Staff and the chiefs of the administrative and supply departments that had almost continuously plagued the War Department in the years preceding the World War. General Pershing selected the heads of his administrative, technical and supply services with the same meticulous care that he employed when he chose the officers of his General Staff. As a result complete loyalty and remarkable efficiency marked the well-coordinated efforts of the entire staff.

In the meantime the War Department General Staff in Washington was having great difficulty in adjusting itself to the colossal task imposed by the war. Of major importance was the problem of securing supplies for the enormous army that was being rapidly mobilized. At the time we entered the War most of the industrial plants on which we might ordinarily rely to obtain essential munitions were fully engaged in the manufacture of supplies for our allies. The necessary industrial expansion to meet our requirements was accomplished only after heart-breaking delays and a great deal of confusion. Supply departments found themselves competing with each other in the procurement of similar items of the limited output of factories. Industrial firms were finding difficulty in obtaining sufficient raw materials, fuel, power and labor to increase their production to meet military and civilian demands.

No one had anticipated such a situation and our War Department agencies were not organized to cope with it. Finally, much was accomplished by the War Industries Board under the guidance of Mr. Bernard M. Baruch.

Procurement problems were not the only grave questions that vexed the War Department General Staff. Enlisting, training and transporting the millions of men that entered the army during the World War taxed the ingenuity and administrative abilities of all who were on duty in the War Department. It was early discovered that the organization of our peace-time General Staff was not designed to cope with such a situation and during the course of the War no less than eleven major changes in organization were made. In 1917 many of the best officers on the General Staff had been permitted to relinquish their posts to seek active service at the front, thus further complicating the problem by bringing into the organization untrained officers at the time when the best of talent and experience was sorely needed.

Maj. Gen. Hugh L. Scott was Chief of Staff at the time of our entry into the World War in 1917. He was approaching retirement age and was soon detached to head an American mission to Russia. He was succeeded by Maj. Gen. Tasker H. Bliss, who in December, 1917 was sent to France as American Member of the Supreme War Council, leaving Maj. Gen. John Biddle as Acting Chief of Staff. Early in 1918 Maj. Gen. Peyton C. March, who had been Chief of Artillery in the A. E. F., returned to the United States to become Chief of Staff. General March effected the most drastic reorganization of the War Department General Staff and attempted to coordinate its activities with the requirements of the military situation overseas.

The Act of May 18, 1917, passed soon after we entered the War, freed the General Staff of all the restrictive provisions of the Act of June 3, 1916. It specifically provided that "all existing restrictions upon the detail, detachment and employment of officers and enlisted men of the Regular Army are hereby suspended for the period of the present emergency."

One of the most sweeping reorganizations of the War Department General Staff was that of Feb. 9, 1918, which provided for the following divisions: War College, which handled war plans, training and instruction; Executive, which looked after administration and military intelligence; Storage and Traffic, which handled priorities of storage and traffic and directed inland traffic and overseas embarkation; Purchase and Supplies, which estimated requirements, fixed manufacturing priorities, and directed production and purchase; and Operations, which supervised recruitment, mobilization, equipment, construction and priorities of troop movements.

In August, General March made another drastic reorganization of the General Staff, this time absorbing practically all of the procurement and supply functions of the various staff departments. The divisions of the General Staff under the new organization were Military Intelligence, War Plans, Operations, and Purchase, Storage and Traffic. The last named division was really a great supply branch within which the supply bureaus of the War Department were almost completely submerged. Maj. Gen. George W. Goethals, builder of the Panama Canal, was called from retirement to become director of Purchase, Storage and Traffic. Under the new set-up, the pendulum had completed its full swing. The last vestige of independence of the War Department bureaus had been lost. In the light of war-time developments previous limitation on the administrative functions of the General Staff seemed ludicrous.

After the close of the World War the necessity for centralization of authority in the General Staff greatly diminished and the staff bureaus began to regain some of their lost functions. It was evident that a complete reorganization of the Regular Army would be made as a result of our World War experiences. Hence, from Nov. 11, 1918, until the passage of the National Defense Act of 1920 the interior organization of the War Department was regarded as somewhat tentative.

After long and careful investigations in which the results of our war-time experiences at home and overseas were evaluated, the Congress in June 1920 passed the National Defense Act, which still stands as the finest and most comprehensive military legislation in all our history. This law provides for the War Department General Staff and the General Staff with troops. The former consists of the Chief of Staff, four assistants in the grade of general officer, and 88 other officers not below the rank of captain. The General Staff with troops is composed of such numbers of officers as are found from time to time to be necessary to perform the General Staff duties at various troop headquarters. The law originally prescribed that General Staff officers were to be selected from the Initial General Staff Corps Eligible List, prepared by a board of general officers, or from an eligible list, restricted to graduates from the Command and General Staff School or the Army War College. The Initial General Staff Eligible List included 586 officers, of whom 305 were Regulars and 281 were chosen from the National Guard, the Organized Reserves and emergency officers.

On the recommendation of the War Department the National Defense Act has recently been amended to abolish the General Staff Eligible List and to eliminate provisions restricting service on the General Staff to graduates of the Command and General Staff School or the Army War College. It is now possible to select members of the General Staff from the very best available material, without regard to attendance at a general service school. It is now possible to utilize on the General Staff the services of all outstanding officers.

Under the National Defense Act the duties of the War Department General Staff are:

"To prepare plans for national defense and the use of the military forces for that purpose, both separately and in conjunction with the naval forces, and for the mobilization of the manhood of the nation and its material resources in an emergency, to investigate and report on all questions affecting the efficiency of the Army of the United States, and its state of preparation for military operations, and to render professional aid and assistance to the Secretary of War and the Chief of Staff."

General Douglas MacArthur, USA-Ret.
Chief of staff of the Army from November 21, 1930 to October 1, 1935. Since the latter date he has been military advisor to the President of the Philippine Commonwealth.

The duties of the General Staff with troops as fixed by law are:

"To render professional aid and assistance to the general officers over them, to act as their agents in harmonizing the plans, duties and operations of the various organizations and services under their jurisdiction, in preparing detailed instructions for the execution of the plans of the commanding generals and in supervising the execution of such instructions."

An echo of previous restrictive legislation is found in the following extract from the National Defense Act:

"Hereafter members of the General Staff Corps shall be confined strictly to the discharge of duties of the general nature of those specified for them in this section and in the Act of Congress approved February 14, 1903, and they shall not be permitted to assume or engage in work of an administrative nature that pertains to established bureaus or offices of the War Department, or that, being assumed or engaged in by members of the General Staff Corps, would involve impairment of the responsibility or initiative of such bureaus or offices or would cause injurious or unnecessary duplication of or delay in the work thereof."

However, there was no occasion for any concern in this direction. Most of the members of the General Staff and the new bureau chiefs were chosen from officers who had important staff assignments overseas and who were thoroughly familiar with the proper distribution and supervision of duties pertaining to the General Staff and the various departments. The old friction between the General Staff and the War Department bureaus at long last had come to a welcome conclusion.

In recognition of his brilliant service to the nation Pershing had been made General of the Armies. However, he consented to assume the additional duties of Chief of Staff and to organize the War Department General Staff as prescribed by the new legislation. One of his first actions was to appoint a board of officers to recommend an organization. This board consisted of Major Generals James G. Harbord and William G. Haan, Brigadier Generals Henry Jervey and Fox Conner, and Colonels John McA. Palmer, Robert C. Davis and John L. DeWitt.

This board not only recommended the organization of the War Department General Staff that is still in force, but also determined policies to guide the General Staff in its relations with the Secretary of War, the Assistant Secretary of War, and the various chiefs of arms and services. So well was this important task performed that the organization and procedure recommended have been followed with scarcely any deviation for nearly twenty years.

The present organization of the War Department General Staff provides for a Chief of Staff, a Deputy Chief of Staff, a Secretary of the General Staff, and five important divisions: Personnel (G-1), Military Intelligence (G-2), Operations and Training (G-3), Supply (G-4) and War Plans (WPD). Under this organization plans for the national defense have been prepared, the procedure of mobilizing our armed forces in an emergency has been worked out, and a myriad of details affecting policies pertaining to recruiting, equipping and training of our army have been carefully studied. The success of our General Staff, both in the War Department and in the field, has been reflected in a tremendous improvement in the efficiency of all components of the Army of the United States.

Our General Staff is essentially an American General Staff. It does not follow any rigid pattern borrowed from any foreign country. Certain features are similar to those of other countries, but the primary purpose of our staff is to meet the needs of our own national defense. It is a much smaller staff than that of any other country of comparable importance, but it has an outstanding record of achievement of which all the army is exceedingly proud.

The credit for the creation and development of our General Staff is shared by three men, Elihu Root, General William H. Carter, and General John J. Pershing. Though Mr. Root did not originate the idea of a General Staff he devoted himself wholeheartedly to its incorporation in the military organization of our country. His tireless efforts, extending over a period of several years, finally overcame seemingly insurmountable obstacles and the General Staff was established by law. Without his perseverance and his great influence this important reform would have been indefinitely delayed.

General Carter's painstaking studies, his fine professional attainments, and his persistent advocacy of this organization were all a great factor in the enactment of the law. His exhaustive research work and his confidential relations with the Secretary of War and with Congressional committees were of vital assistance in the preparation and consideration of this legislation.

The sound judgment and genius for organization of John J. Pershing made our General Staff organization in France an immediate success. The adaptation of this organization to our peace-time army proved the soundness of the agency which he set up under the stress of war. General Pershing will be remembered in history for his brilliant leadership of a great American Army to the triumphant conclusion of the greatest war of all history. However, he should also be held in grateful remembrance for his perfection of our General Staff.

In his final report as Chief of Staff made just before his retirement from active service in 1924 General Pershing said:

"Not since the creation of the General Staff has there been more helpful cooperation and mutually cordial understanding than now exist between the General Staff and the various branches of the War Department. I believe the present General Staff organization, its methods and its relations to the War Department are as contemplated in the organic law creating the General Staff, and as this development is largely based on our World War experience, I sincerely hope that in all essential particulars it will remain unchanged."

The conclusions reached by General Pershing fourteen years ago are as applicable today as they were then. The system he developed will long endure. It meets the peace requirements of our army and it contains all essential elements needed to withstand the shock of war. Practically all of our general officers of the line and staff and hundreds of other able officers have served as members of the General Staff. They have contributed their talents and abilities to the success of the entire army. At the same time their service on the staff has broadened their outlook and extended their professional education. The accomplishments of the General Staff will ever be a monument to the foresight and statesmanship of Root, Carter and Pershing.

Music for the Services

IN peace and in war music has lightened the burdens and gladdened the hearts of America's fighting men on land and sea. From the Fife and Drum Corps of '63 to the well rounded bands and orchestras of today, the Army, Navy, and Marine Corps service musicians have preserved the marching songs of the soldiers and the chanties of the sailors, have made long days in garrisons and long journeys at sea more bearable, and have expressed in rhythm and tune the motives for which men fight.

The fifes and drums which resounded with the Battle Hymn of the Republic and Dixie in the Civil War, remained the typical form of Army music until some years after the war. Then trumpets and other instruments were added, so that by the time the Spanish War came about the typical service band had between 20 and 28 pieces and constituted a military band more nearly of the type we know today.

This type of band played for the men, in training camps and on foreign soil, such long remembered tunes as "There'll be a Hot Time in the Old Town Tonight," "Just Break the News to Mother," and "Dolly Gray."

When the World War came General Pershing expanded the bands to 48 players and commissioned musicians as their leaders. In the camps in this country, at sea, and throughout France American tunes—the old homely ones of Stephen Foster, the sprightly tunes of Victor Herbert, and those born of the times: "Over There," "Keep the Home Fires Burning," "There's a Long, Long Trail a Winding," and the ubiquitous "Mademoiselle from Armentieres"—made life easier and happier for the millions of youths and men who left their homes to fight for the nation. At the close of hard days, tired men relaxed to classics and sang with the rollicking tunes. At Sunday's worship the bandsmen turned to the old hymns and aided the chaplain in his work.

After the War the bands of the Army were reduced in strength to 35 players each and the leaders made warrant officers instead of commissioned officers. A few years later they reverted to the prewar strength of 28 members. Shortly before the war a system of training musicians and leaders had been instituted with headquarters in New York. Many were sent to the Institute of Musical Art in New York. This system grew into the Army Music School with the purpose of training men to become band leaders. This school was later moved to Washington and for some years had its headquarters in the Washington Barracks. This was discontinued about 12 years ago, having built up a long list of men qualified as band leaders and awaiting appointment.

Today many people throughout the nation know the services best through the renowned service bands, particularly the three representative organizations, The Army Band, The Navy Band, and The Marine Band, all of whom have their headquarters in Washington and make frequent radio broadcasts for the benefit of music lovers all over the nation. The traditions behind these bands rank with the highest in the service. A one-time leader of The Marine Band, John Phillip Sousa, is rated as the greatest band leader and composer of marches in history. The Army Band is the one organization that represents the entire service—not one arm or branch, but the Army as a whole.

Two other bands widely known are the United States Military Academy Band and the United States Naval Academy Band.

There are today in the Army 86 regimental bands, while the Navy maintains 57 bands and 10 orchestras with a total of 1,072 naval musicians. The Marine Corps, too, has bands at Quantico and San Diego.

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The Legal Work of the Services

by Major General Allen W. Gullion

The Judge Advocate General of the Army

ALTHOUGH there was a Judge Advocate General of the Army as early as 1776, The Judge Advocate General's Office, with a Corps of Judge Advocates, was not established by Congress as a permanent institution until 1862. It was therefore a yearling, headed by Colonel (later Brigadier General) Joseph Holt, a former cabinet officer and distinguished Kentuckian, when the ARMY AND NAVY JOURNAL was founded in 1863. From all accounts, the corps was completely engulfed in work at that time, since the Civil War was very prolific of courts-martial. Like the JOURNAL, The Judge Advocate General's Office continued to grow. The Bureau of Military Justice, also headed by The Judge Advocate General, was established in 1864, and two years later ten additional judge advocates were provided for the corps. In 1884, the Bureau of Military Justice and the Corps of Judge Advocates were merged into The Judge Advocate General's Department, under the supervision of The Judge Advocate General. The Spanish-American War caused increased legal work for the military establishment and when the war ended a number of volunteer officers were permanently commissioned in the department. However, when the United States entered the World War only seventeen officers held commissions in the department and it was, therefore, necessary completely to reorganize it. Accordingly, a large number of qualified emergency officers were obtained for legal work, so that in 1919 there were three hundred seventy-three officers on duty with the department. Most of these officers returned to civil practice at the end of the war, but a large number of them were permanently commissioned in the department following the amendment of the National Defense Act in 1920. The strength of the department since June 30, 1922, has been one hundred five officers in grades from colonel to captain, inclusive, whose names are carried on the Promotion List. The Judge Advocate General is appointed from the colonels of the department, for a period of four years, and has the rank of major general while so serving. Of the one hundred five officers now in the department, thirty-six are assigned to duty in the Office of The Judge Advocate General and the others are on duty as legal advisers at the headquarters of corps area, department, tactical division and other commanders, and elsewhere in connection with certain special legal duties. Some fifteen of these are officers of other branches of the service who are detailed as students at approved law schools with a view to qualifying themselves eventually for transfer to the department.

The scope and duties of The Judge Advocate General's Department have vastly changed during the past seventy-five years. From being strictly a legal service that dealt with courts-martial alone, it has become the law branch of the War Department and of the Army, dealing with every phase of law that officially affects these organizations, their instrumentalities and personnel. The Judge Advocate General is the legal adviser of the Secretary of War, The Assistant Secretary of War, the Chief of Staff, the Deputy Chief of Staff, the Assistant Chiefs of Staff, and the chiefs of arms, services and bureaus of the War Department. The scope of his duties now includes the legal phases of the business, property, and financial operations under the jurisdiction of the Secretary of War, the legal questions growing out of the administration and control of the personnel of the military establishment, and the legal phases of military disciplinary action. He is also the custodian of the records of all general courts-martial, courts of inquiry, and military commissions, and of practically all papers relating to the titles of lands under the control of the War Department.

The work of the Judge Advocate General's Office consists of two broad divisions—military and other activities. The volume of business in both divisions has expanded greatly during the course of time, especially since the World War. The Articles of War have from time to time been modernized so as to accord with changed conditions, and the appropriate limits of punishment have also been changed to conform to modern penal requirements. In this way, an attempt has been made to keep courts-martial abreast of modern criminology, a most important matter, since the court-martial is the legal tribunal designed to aid a military commander in the enforcement of discipline and in compelling an observance of military law and order.

by Rear Admiral Walter B. Woodson, U. S. Navy

The Judge Advocate General of the Navy

IN the year following the founding of the ARMY AND NAVY JOURNAL, Gideon Welles, Secretary of the Navy, wrote: "The Navy Department had no solicitor or law officer with whom I could consult or with whom I could share responsibility." This deficiency was supplied by his appointment in that year of a "Solicitor for the Navy Department." Mr. Welles' action met with Congressional approval. In 1865 appropriation was made for a "Solicitor and Naval Judge Advocate General," and the Honorable John A. Bolles was appointed. Mr. Bolles and his office were dropped from the Navy Register in 1870, however, and, with the title of "Naval Solicitor," he was included in the Department of justice.

Ten years later the Congress recognized the need for a legal officer as an integral part of the Navy Department organization. By an act approved June 8, 1880, the office of The Judge Advocate General of the Navy was created to be held by an officer of the Navy or Marine Corps who was to be the legal adviser of the Navy Department, its bureaus and offices. Captain William B. Remey, of the U. S. Marine Corps, was the first Judge Advocate General.

The Judge Advocate General is charged by law and by Navy Regulations with cognizance of all matters of law arising in the Navy Department. Some of the more important of these matters of law are review of courts-martial, examination and retirement proceedings, legislation, contracts for ship construction, patents, admiralty law, administrative law, international law and matters concerning real estate in which the Navy is interested.

Many laws which concern the Navy alone are enacted and many others are proposed; in addition, numerous bills are introduced which affect the Navy in one way or another. All such legislative matters affecting the Navy are referred to the Secretary of the Navy. The Judge Advocate General obtains the Department's views and draws up its recommendations.

The extent of the Navy's real estate holdings is large. In 1863 the jurisdiction extended to very few properties on shore; today, the naval establishment includes many shore activities such as naval air stations, radio and radio direction finder stations, ammunition depots, torpedo stations, fuel depots, training stations, naval hospitals and naval petroleum reserves. The legal problems arising in connection with the Navy's real estate holdings, the acquisition of additional lands, and the leasing of properties needed for naval use require the services of attorneys expert in real estate law.

Contracts for new ship construction and contracts for the supply of armament are drafted in the Office of the Judge Advocate General. The work incident to these contracts, particularly during the recent rebuilding program, has made this work one of the most important functions of the Office.

Changing times have produced no change in the concept of naval discipline; the laws for maintaining that discipline have come down to us with little alteration since 1863. There have been developments in the machinery for administering the laws as they existed then, but there has been no sweeping revision of the laws themselves.

In 1862 Congress took cognizance of the orders, regulations, and instructions which had then been issued by the Secretary of the Navy and which had been approved by the President and passed a resolution giving those orders and regulations the force and effect of law. Those orders and regulations are today the basis of the Navy Regulations.

The record of proceedings of every court martial, after review by the officer ordering it, is reviewed in the Office of the Judge Advocate General. The Articles for the Government of the Navy provide that "The Secretary may set aside the proceedings or remit or mitigate, in whole or in part the sentence imposed by any naval court martial convened by his order or by that of any officer of the Navy or Marine Corps." The review by the Judge Advocate General is made with this power of the Secretary of the Navy in view.

In the Navy of today there are few offenders and few courts-martial. The Navy prison population is very small. All of which make the work of the Office of the Judge Advocate General easier and—happier.

Civilian Military Education

(*Continued from page 91*)

trained; there were 35,000 admitted to the camps this summer. In his last report, the Secretary of War again recommended that the number of trainees be increased to 50,000.

As a force making for democracy and good-will among our people, the C. M. T. C. is unsurpassed.

Woodrow Wilson once said, "I am always glad to see the uniform worn in connection with education. It signifies that the man is not living for himself alone, but for the social life at large."

It is often said that the future of a nation lies with its youth. If we can accept the statements of those who have passed through the R. O. T. C. and C. M. T. C., we are safe in asserting that military training has influenced for good the thoughts, habits and happiness in life of a large number of people, making for good understanding and solidarity among them.

We pay tribute to those who sponsor today, as did Olden Partridge and Leonard Wood the yesterday, the forward movement of this American activity which means so much to the stability and safety of this nation.

The Army Reserve Corps

(*Continued from page 82*)

able allowances for uniforms and for time devoted to training on a inactive status, the latter to serve not as "pay" but rather as reimbursement for actual expenses incurred in connection with such training. It is estimated that to put such proposals into effect would cost less than $7,000,000, a sound investment when viewed from the standpoint of increasing interest, morale and efficiency in the Corps and avoiding the annual loss of 3,000 to 5,000 young officers whose training has cost the Government $3,000,000 to $5,000,000.

With respect to the second phase of the general problem pertaining to the strength of the Corps, the R.O.A. heartily supports the War Department's program, namely, to increase the number of advanced course students in Senior R.O.T.C. units and to establish new units in qualified schools and colleges desiring same, the general objective being to increase the number of annual graduates to 8,000.

In view of the tremendous responsibility which would devolve upon the Officers' Reserve Corps in providing 80 per cent of the officer personnel for a great National Emergency, and recalling our experience in the World War, it would be reasonable to expect the Government to provide active duty training annually for these officers as it does for the other civilian component. Such is not the case, however, appropriations having been sufficient to train officers of the Arms on the average of only once in 3.4 years and officers of the Services on the average of only once in 7.7 years. This questionable policy is based upon the theory that most of these officers will not be needed for two months or more after mobilization and their training can be completed during that period.

To remain on the active list, i. e., eligible for assignment, active duty and promotion, members of the O.R.C. are required to perform a considerable amount of training on an inactive and non-pay status. In fact, the inactive training is so essential in preparation for the active duty training that the line of demarcation between the two is become less and less distinguishable — another cogent reason for the monetary allowance referred to above. Last March 57,000 Reserve officers were enrolled in Army extension courses, a fact which speaks volumes for the spirit and patriotism of the Corps.

Yes, the O.R.C. has developed into a strong, courageous and ambitious young man, and if he is given his proper chance for further training and development he will be able to back up his brothers and give a good account of himself in any scrap.

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In 1917, when Uncle Sam wanted a military truck, Waukesha engineers cooperated with other leaders in the industry to design just what was needed. And more significant than this is the fact that eleven days after the specifications reached Waukesha, the first Class B Military Truck engine was on its way to Washington.

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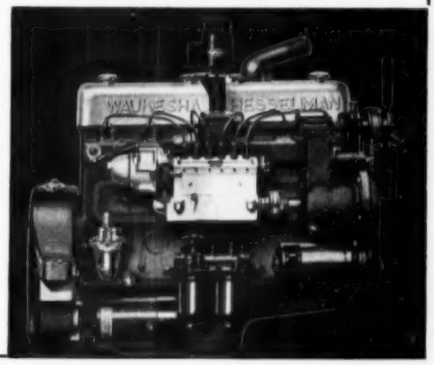

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SHELL

Development of U. S. Rifle

ONE of the most interesting and most important developments in military life during the history of the ARMY AND NAVY JOURNAL has been the progress made in small arms, particularly in the soldiers' shoulder rifle. As a matter of fact, the JOURNAL came into being just in time to witness the important transition from the muzzle loading rifle to the breech loading type.

Flint Locks

The first rifle manufactured by the United States was a flint lock smooth bore musket, a virtual copy of the French Charleville, Model 1763, which had been furnished the colonists in quantity during the Revolution. This venerable weapon had a calibre of .70 inch and fired a 440 grain bullet. It was standard until 1842 when the conversion to percussion type, begun in 1822, was completed. The rifled barrel was the next advance and 1855 saw the famed Springfield rifled musket become the Army's principal firearm. This weapon also marked the abandonment of the old spherical bullet and the introduction of the elongated lead bullet. The 1855 Springfield reduced the bore to .58 inch but raised the bullet weight to 500 grains.

The Civil War brought on the demand for a breech loading rifle and in 1865 5,000 weapons were modified to breech loaders for field test. The 1866 model, a breech loader, which reduced the bullet to 450 grains remained standard until 1892 when it was replaced by the Krag-Jorgensen. In the intervening period before the advent of the Krag the earlier rifle was modified in a number of respects principally by reducing the caliber to .45 inch and the bullet weight to 405 grains. The .45 Springfield was last used in the Spanish War and early in the Philippine insurrection.

The Magazine Rifle

The Krag-Jorgensen weighed slightly more than nine pounds, was of .30 caliber and fired a 220grain cupro-nickel jacketed bullet. It was of magazine type, loading five rounds. Two subsequent models were issued, 1896 and 1898.

This weapon functioned excellently but in spite of its magazine capacity soldiers used it generally as a single shot weapon rather than to stop to insert the five individual rounds. This led to a demand for a clip making the loading of five rounds a single operation.

The next development was the U. S. Rifle .30 Model 1903, which with some modifications in bullet weight and muzzle velocity remains the standard weapon to the present day.

Problem of Production

Upon our entry into the World War we were faced with the problem of producing sufficient rifles for the unprecedented numbers of troops going into the service. Our arsenals could not possibly produce enough to fill the demand and the commercial firms did not have the necessary fixtures, tools and gages to go into production with the Springfield in any reasonable length of time. Commercial firms, however, had been manufacturing the British Enfield .303 for some time for England, so after due consideration we decided to modify the Enfield to take our .30 caliber bullet and go ahead with its production. Since the War, however, the Army put the Enfields in stock and returned to the Springfield — generally considered unsurpassed as a military weapon.

Before the World War had ended we were experimenting with a semi-automatic rifle, which would enable the soldier to fire a shot with each pull of the trigger without any other operation being necessary to load the chamber. After years of tests with many types and after once virtually settling on a .276 caliber semi-automatic, the War Department finally adopted a .30 caliber semi-automatic. The .30 caliber was decided upon so as not to complicate the ammunition supply.

Semi-Automatic

The new semi-automatic, MI, an Ordnance Department product, is looked upon with high favor. More money has been supplied for the manufacture and issue of this type to more regiments of Infantry this year. Eventually it will replace the venerable Springfield, Model 1903, but because it is unlikely that funds will be supplied to put enough of the new weapon into war stocks we shall probably enter our next war with soldiers armed with the 1903 Springfield. Under such circumstances we would go into production with a semi-automatic hoping to replace the bolt action in time to become really effective.

All of the rifles mentioned above, with the exception of the Enfield, have at one time in their history, been manufactured by the Springfield Armory. Mr. John C. Garand, the inventor of the MI rifle, is a civilian employee of the Springfield Armory who was employed for the purpose of developing the semi-automatic.

Military Powder

(*Continued from page* 78)

simply training centers where personnel become familiar with manufacturing technique. In case of a major emergency the productive capacity of arsenals for smokeless powder and for the loading of ammunition would be relatively small when compared to the tremendous plants which would have to be brought into existence to meet war-time demands. Arsenal production would serve to meet urgent requirements of the early stages of a war. From the arsenals would come personnel equipped to instruct and assist private industry in what is required of it and at the same time train the ammunition inspection forces so that they would be able to perform their duties capably and with dispatch.

But over and above all this, the great American chemical industry now so efficient in the production of plastics, lacquers, nitro-cellulose and other compounds closely allied to smokeless powder, would be the mainstay of our military and naval defense so far as powder is concerned. For this reason our great private chemical industry is a tremendous potential defense factor just as our other major private industries are defense factors. Our military propellants are of the highest chemical effectiveness. While it is to be hoped that America's military strength will have no cause for use during the next three-quarters of a century there should be real consolation in the knowledge that our military propellants, which give strength to the strong arm of the fighting man, represent high technical achievement. This is attested not only by the services themselves but by civilian marksmen who, like the minutemen of '76, are keeping alive the all-important tradition of the trusty rifle and the accurate aim.

The JOURNAL has lived to see the day, after three-quarters of a century, when the mere mixing of charcoal, saltpeter and sulphur to make black powder has given way to the nitration of cotton as the basis of smokeless powder. The JOURNAL has witnessed no greater defense achievement for it would be difficult to overstate the importance of the nitrocellulose industry to the fighting forces of the United States.

Insurance in the Services

THE money the nation pays for the maintenance of its armed forces often has been likened to payments on an insurance policy against the ravages of war. It is money the citizenry is glad to pay as a deterrent against attacks from outside and as a reasonable assurance of victory without too great a loss should war be forced upon us.

It is also true that these great peace-insurers—the Army, Navy, Marine Corps and Coast Guard — recognize and are large users of the insurance resources of the nation.

Commercial facilities are used by all the services to bond those classes of responsible officers who are required under laws and regulations to furnish bonds. The individual officers and employees engaged in this work pay their own bonding fees and are free, within certain limits, to select their bonding agencies.

Also as individuals, the officers and men and their families are large users of insurance. Government insurance is available and many make use of it, but because of the limitations in insurable amounts they are also large users of commercial life insurance as well as fire, theft, automobile, and other types of protection.

The attitude of the Departments toward insurance is exemplified in the following circular issued recently by the War Department:

"1. It is universally recognized as a direct and personal obligation of every responsible citizen to provide that, in the unfortunate event of his demise, adequate financial provision is assured for his dependents. To the officer of the Army, who has little opportunity to accumulate an estate sufficient for this purpose, life insurance offers the most satisfactory and frequently the only solution of this problem.

"2. Government life insurance up to $10,000, is available to all who apply therefor within 120 days after entry into the military service. Details regarding this insurance are fully set forth in Army Regulation 600-100, and all military personnel should be familiar with the privileges thus available. When insurance in excess of $10,000 is desired other sources are available.

"3. The War Department desires that commanding officers of all Regular Army units and stations actively encourage individuals under their command to provide ample insurance protection for their dependents. Care will be taken that new personnel, including members of the Officers Reserve Corps ordered to extended active duty, are fully instructed regarding the Government life insurance available to them."

Retail Sales in the Armed Forces

LIVING in their own communities, in many instances many miles from the conveniences enjoyed by cities and larger towns, or training at sea for weeks at a time, the Armed forces have developed their own systems of sales and distribution of the many daily necessaries the soldier and sailor must have.

In the case of the army there are two systems of retail sales to the soldiers. One of the Commissary operated by the government and with government funds. The other is the Post Exchange operated by and for the men. In the Commissary, according to the size of the post and the demand expressed by its garrison, there are as many as 450 different items of food and household necessities stocked for resale. Meats and dairy products usually are handled as well as complete stocks of nationally known brands of canned goods, etc. This agency is operated by the government for the convenience of the personnel. The brands sold in these stores are governed entirely by the demand expressed by the personnel dealing there.

Post Exchanges

The Post Exchange is a cooperative organization operated by the military organizations and the profits from which are employed exclusively for the benefit of the enlisted men, i.e. for the purchase of athletic equipment, radios for the day rooms, extras for the mess, etc. The purchases for resale in the Post Exchange are those for the personal needs of the enlisted men but like the Commissary, brands stocked are governed by the demand expressed by the customers.

In the vessels of the Navy there are two types of stores: the Ship's store, operated by the government with government funds, and the Ship's Service Store, operated with the funds of the men themselves. A total of 119 different classifications of goods may be handled in the Ship's Store. These run from cigarettes, cakes, etc., to certain articles of clothing. The profits from the Ship's store are limited to 15 per cent and must be expended for the "amusement, comfort and contentment of the enlisted force." As a matter of practice most of the profits are now going to the operation of motion pictures aboard the vessels. In the fiscal year 1937 these stores had a turn-over of $2,526,644.24, while the Commissaries ashore (operated similarly in many respects except that they are not restricted in the number of items they may sell and the profits are not turned back to recreational material) sold $2,853,179.96 worth of goods. There are 87 Ship's Stores and 10 Commissaries.

Stock Carried

Ship's Stores may carry stock valued at from $3,000 to $15,000, according to the complement of the vessel, but these amounts may be increased by certain percentages when the vessel leaves to operate in waters outside the United States.

In addition, the law permits the commanding officers of vessels to authorize certain "Ship's Activities" among which are laundries, barber shops, shoe repair shops, tailor and pressing establishment, photographer and a Ship's Service Store. The latter must not duplicate articles sold in the Ship's Store, when there is one of the latter agencies aboard. The Ship's Service Store is not operated with government funds but with the funds of the men themselves and the profits must be expended for the welfare of the personnel.

Marine Corps Personnel

The Marine Corps personnel may, of course, purchase at the usual Navy retail stores, but on posts of their own, or where there are large garrisons of them, they often operate their own Post Exchanges on a basis similar to that of the Army.

In the Coast Guard, both on board the larger vessels and at the larger shore stations retail stores are operated known as Canteens. These are run on virtually the same basis as the Army Post Exchanges and the Navy's Ships' Services Stores, that is, they do not use government funds and the profits are expended for the enlisted personnel.

The U. S. Army Veterinary Service — 75 years

Not Only Care and Treatment of Military Animals, But Inspection of Meats, Meat-food, and Dairy Products Marks Service to Army; 145,000,000 pounds examined for Regular Army in Year

by

Lieutenant Colonel Raymond A. Kelser

Chief, Veterinary Division, Office Surgeon General of the Army

THE past seventy-five years have witnessed great progress in the development of veterinary service in the United States Army, especially during the latter third of this period. At the beginning of this era, veterinary medicine, as a profession in the United States, was in very poor standing. While a few graduates from reputable European colleges came to America to practice their profession, a large part of the veterinary work in the United States at that time was in the hands of untrained, self-styled veterinarians, many of whom were illiterate. As the Army offered so little inducement for veterinary service, it is obvious that the best of such veterinarians as were available in the earlier periods were not attracted to it.

Prior to 1863, such veterinary service as was provided for Army animals was rendered by farriers and later by "veterinary sergeants" of essentially no better training. In 1863 one veterinary surgeon was authorized for each cavalry regiment of the Regular Army and each volunteer cavalry regiment. The pay was $75.00 per month and they were given the nominal rank of regimental sergeant-major for quarters, fuel allowances, etc. This lack of adequate veterinary talent during the Civil War was responsible for great losses among Army horses and mules.

In 1866, Congress added four regiments of cavalry to the Army and authorized for each of these new regiments one additional veterinary surgeon at a salary of $100.00 per month. The old cavalry regiments were not allowed the additional veterinary surgeon. Thus, there were four cavalry regiments each with two veterinary surgeons who were paid respectively $100.00 and $75.00 per month, and six cavalry regiments each of which had but one veterinary surgeon who received a salary of $75.00 per month.

A forward step of significance was taken in 1879. Prior to that time, graduation from a reputable veterinary college was not a requirement for Army appointment. In that year it was required that "hereafter appointments in the veterinary corps will be confined to graduates of established and reputable schools or colleges."

No further changes of importance were made in the status of Army veterinarians or in the manner of their appointment until 1899. In that year two veterinarians were authorized for each regiment of cavalry, one to have the pay and allowances of a second

(*Continued on page* 134)

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BROOKLYN, N. Y.

The U. S. Army Today

(Continued from page 15)

have avoided over-standarization, lest we might thus freeze progress. Aircraft manufacturers and designers have been encouraged to incorporate in our military airplanes the most advanced improvements and the latest developments in design and operation. The Air Corps has continually under extended service test a number of experimental planes, with a view to determining the practicality of projected improvements in aeronautical engineering and design. As a result we feel that our new planes equal the best in the world.

While the augmentation of our air defenses represents the most spectacular advance in recent years this is only one feature of our program of modernizing our Army. Motors have replaced horses in nearly all of the supply trains of the Regular Army and the National Guard. Much of our Field Artillery has been motorized and otherwise improved in order to increase greatly its usefulness in modern combat. Steady progress has been made in the procurement of antiaircraft Artillery, fast light tanks and semi-automatic rifles.

Modernization of Equipment

The modernization of the equipment of our Army has indicated the desirability of sweeping changes in organization. The growing use of motors for the transportation of foot soldiers has confirmed the belief long held by many of our military leaders that our Infantry Division was too large. A smaller organization with great mobility and fire power seemed to be indicated. Extended experiments have been conducted with a division tentatively organized to meet new conditions. The subject is still under study. Present indications point to a reduction of our war strength division from the present authorized strength of 22,000 to a number between 10,000 and 13,000.

While a great deal has been accomplished in the past few years much remains to be done before we can consider our Army thoroughly modernized. However, it is very gratifying to be able to report that very much more progress was made in the last five years than in the previous fifteen. The recent session of Congress was productive of much constructive legislation of great benefit to the Army. It not only provided funds to strengthen the Army in personnel and equipment but it also passed several laws which will be of great assistance in improving the morale and efficiency of the Army.

The Military Appropriations Act for 1939 gives a definite impetus to our program of modernization by making available funds for the procurement of new airplanes, antiaircraft weapons and other equipment. Allocations of funds from appropriations made under the Recovery Act will greatly accelerate provision for adequate housing for thousands of officers and enlisted men now shabbily sheltered in buildings of temporary war-time construction. At the same time this new Army construction will employ many thousands now jobless and will greatly improve the entire construction industry.

Increase Personnel

An act was passed by the last Congress increasing the authorized strength of the Commissioned personnel of the Regular Army to 14,659. At present we lack about 2,000 of reaching this number, but I hope that the Congress will authorize the orderly procurement of these additional officers at the rate of 400 or 500 per year so that in four or five years we will reach this strength. This will enable the War Department to commission in the Regular Army each year a considerable number of R. O. T. C. graduates.

Funds are provided in the Appropriations Act for 1939 for adding 3,000 enlisted men to the Regular Army, bringing its enlisted strength to 165,000, thus enabling us to fill enlisted vacancies in some of our combat regiments and also to provide a needed increment for the Army Air Corps. Provision has also been made for increasing the National Guard by 5,000 men, enabling it to reach a total strength of 205,000 during the current year.

A goal long sought by the Army has at last been achieved in the establishment of a Regular Army Enlisted Reserve. Acting under authority of a recent Congressional enactment the Army began on July 1 the recruitment of this Reserve. Those enrolled are all former soldiers of the Regular Army. In case of emergency these trained reservists may be called to the colors promptly and without further instruction will be ready to take their places in the ranks of Regular Army organizations.

Broaden GSC Selections

Acting on a War Department recommendation the Congress has broadened the field from which officers of the General Staff Corps may be selected. The General Staff Corps Eligible List has been abolished and the legal requirement that General Staff officers must be selected only from graduates of the Command and General Staff School or the War College has been eliminated. Due to age or exigencies of the service many outstanding officers have not had the opportunity to attend the general service schools and the legal bar to their service on the General Staff was not only unjust to the officers but also against the best interests of the War Department. Now all outstanding officers of the Army are available for this highly important duty.

During the current fiscal year provision has been made for two weeks' training for 30,000 Reserve officers, an increase of 5,000 over the last fiscal year. This number is in addition to some 800 Reserve officers on extended active duty with the Air Corps, the usual number of Reserve officers on duty with the Civilian Conservation Corps and some 550 on one year's active duty with the Regular Army under the terms of the Thomason Act.

Training of Reserves

Increased appropriations for the Reserve Officers' Training Corps will make possible the training of 2,500 additional advanced students. The number of students trained for 30 days in Citizens' Military Training Camps remains at approximately 35,000.

From the standpoint of Industrial Mobilization, an activity directly under the supervision of the Assistant Secretary of War, the Educational Order Act, which was passed in the closing days of the 75th Congress, is one of the most constructive steps taken since the War. Successful production of complicated munitions requires literally months of study and preparation before a single item can be fabricated. A new arrangement of the plant may be required. Special machine tools must be designed and built. Complicated and difficult aids to manufacture must be worked out on the drafting board and then constructed to fit the particular machine tools available in the plant. Labor must be trained in utilizing these tools for the purpose intended. All this work must be done before actual production can even begin. Such experience may be gained by our industrial plants only through actual production of the article. The most effective and economical answer that has been found to this problem is the educational order. The War Department has long urged the enactment of a law permitting educational orders for munitions. Under this new law the War Department now has the authority to place small contracts for items of munitions with the plant which will be depended upon in war for the manufacture of the item and is authorized to require as an integral part of this manufacture a complete mass production study and the acquisition of all of the tools, dies, fixtures and special machines required for such mass production. The Act provides for the expenditure of $10,000,000 appropriated over a five year period. The program for the first year is now in course of preparation.

Special Machinery

Closely related to educational orders is an appropriation for the procurement of special machinery, gauges, jigs, and dies, required to expedite the manufacture of munitions at the beginning of an emergency. Its vital importance cannot be overestimated.

While our program for more adequate national defense is well advanced we should continue our efforts toward the attainment of our objectives and the continued maintenance of our Army at a strength sufficient to assure its effectiveness. It is to be hoped that future appropriations will make it possible for us to maintain the Army at its full authorized strength in officers and enlisted men and to acquire the latest and best in all types of military equipment.

Our National Guard should have on its rolls at least 210,000 men. We should have available for assignment at least 120,000 Reserve officers. We should have a Regular Army Enlisted Reserve of 75,000. We should reach and maintain an aircraft strength of 2,320 modern serviceable military planes within the next two years. Additional motor vehicles should be procured to provide modern transportation for the greater part of our mobile troops. Our procurement of antiaircraft Artillery should be greatly accelerated. Seacoast defenses should be modernized and augmented. Our housing program, now fortunately so well-advanced, should be continued until adequate provision has been made for the comfortable shelter of all of our troops.

The efficiency of an Army depends in the last analysis on the ability and morale of the individual soldier. In this respect the United States Army is singularly fortunate. In every component of the Army, our soldiers are alert, intelligent and eager to serve. Their morale is exceedingly high. In our Army the interests of the government and that of the individual soldier are identical. Whatever affects the individual favorably is reflected in increased efficiency throughout the service. Hence, it will ever be the aim of the War Department to study the needs of each individual soldier and to do everything possible to promote his welfare.

The high efficiency of our fine Army is primarily due to the splendid devotion to duty characteristic of our soldiers of all ranks. To them, our citizens look for national security and to them the country is deeply grateful.

Electrical Progress in the United States Navy

by Lt. Comdr. Louis Dreller, USN

Head of the Electrical Section of the Bureau of Engineering

ONE of the most impressive facts to a visitor on a modern man-of-war is the wide-spread use of electricity and the most frequent exclamation is, "What a mass of cables there is on this ship." Electricity is used for radio, lighting, cooking, interior communication, fire control, steering, ventilation motors, training and moving the guns, and for main propulsion, as exemplified in the Lexington's 180,000 shaft horsepower electric drive installation with its almost unbelievable flexibility and simplicity of control.

This "mass of cables," with its switchboards, generators, motors, controllers, instruments, searchlights, and devices, reflect the progress of the nation and its increasing use in the Navy is due in a large measure to the courage and farsightedness of those naval officers who, very early, foresaw the advantages of electricity. In this group of farsighted and courageous naval engineers the name of Admiral S. M. Robinson, who made "electric drive propulsion a reality in the Navy," will always have a high place.

Incandescent Lighting

Electricity in the Navy may be said to date back to the first installation of an incandescent lighting plant on the Trenton in 1883. The plant consisted of an Edison shunt wound, 110 volt generator having a capacity of about 13.2 KW. The generator was driven by a horizontal Armington and Sims single cylinder steam engine with a steam pressure of about 30 lbs. per sq. in. This epical lighting installation consisted of a total of 247 lamps with 2,978 candle-power. What a step to a lighting plant on a modern man-of-war with its 6,000 lighting fixtures. The installation on the Trenton was highly successful and was due in a great measure to the constant supervision of Lieut. Comdr. Bradford, who had supervised the installation and Ensign E. H. Tillman, who succeeded him. The "skeptics" had been shown that the new-fangled science of electricity had a definite place on board a man-of-war. From then on the growth of electricity in the Navy was assured, and paralleled the progress of the electrical industry. Steam driven units were superseded by motors, reciprocating driven generators were replaced by highly efficient light weight turbine driven generators.

Probably the three outstanding electrical accomplishments in the Navy in late years has been the introduction of electric drive propulsion, the installation of alternating current ship's service lighting and power plants on surface ships and the installation of Diesel electric drive on submarines.

Turbine Electric Drive

Turbine electric drive was first installed on the Collier Jupiter in 1913. As a result of its successful performance on the Jupiter, the Navy decided in 1915 to install turbine electric drive propulsion on the New Mexico. Every battleship in commission built subsequent to the New Mexico is equipped with this type of drive. The outstanding development of electric drive is reflected in the 180,000 shaft horsepower plants on the Carriers Lexington and Saratoga and on the new French Liner, Normandie.

Perhaps the most unusual duty performed by a man-of-war was the furnishing of electric power to the City of Tacoma. Due to an unprecedented drouth during the summer and fall of 1929 the reservoir of Lake Cushman was so depleted as to seriously reduce the output of the hydro-electric plant which furnished power to the city of Tacoma. For 30 days, from December 17, 1929 to January 16, 1930, the USS Lexington furnished electric power to the city of Tacoma. During this period 4,250,960 KWH were furnished the city without interruption of power.

Rigorous Standards

There are many special problems connected with the use of electricity on naval vessels. The equipment must be reliable, economical in weight and space, able to withstand shock and vibration and stand up under the corrosive action of salt spray and salt air. These problems are being constantly attacked by our technical personnel in the various Bureaus, Laboratories, Navy Yards, Shipyards and private industry. A constant demand by the Navy on the industry for light weight superior equipment has resulted in improvements in design, materials and construction technique which benefits the entire electrical industry and the nation.

Electricity is young; its progress and use in the Navy in the last fifty years has been remarkable. Its future development is assured. Who can predict its progress in the next fifty years!

Industries in War

(*Continued from Page 79*)

forms, underclothing, canvas and web equipment, gas-proofed materials; yardage goods including wool, cotton, silk, rayon, hair, etc.

Electrical—Radio, telephone, telegraph and other electrical communication appliances; batteries, bells and buzzers, control apparatus, X-ray equipment; heating and lighting; automotive and aircraft electrical systems; industrial and hospital apparatus, power plants generators and motors.

Machine Tool and Machinery—Machine tools for factories, laboratories, arsenals, etc.; marine auxiliaries, excavating and dredging, metal working, mining and quarrying, road making, printing plant, etc.

Gages, Dies, Jigs, Fixtures and Precision Instruments—Measuring and computing instruments, gages, dies, etc. necessary for mass production of munitions. Laboratory instruments and meteorological instruments.

Optical—Field glasses, cameras, fire control instruments, bomb sights, navigation instruments, goggles, theodolites, transits, etc.

Brass—Cartridge cases, shell, fuzes, bearings, primers, metal components of fire control instruments, compasses, etc.

Leather—Harness, saddles, belts, shoes, boots, scabbards, gloves, clothing, instrument cases, aviation equipment, pistol and gun holsters, bags, etc., industrial belting.

Hardware—Horseshoes, locks, harness hardware, hoists, blocks and pulleys, construction hardware, metal components of pontoon bridges, bridge hardware, tent hardware, stoves, tanks, water supply systems, etc.

Lumber—Bridge timbers, chests, tent poles and pins; wire reels, footbridges, construction materials, railroad ties, telephone poles, ship stock, combat wagon bodies and parts, hospital furniture.

Aluminum—Mess kits, kitchen gear, canteens, food containers, aircraft, railroad equipment, automotive equipment, communication equipment, communication components.

Rubber—Automobile and aircraft tires and tubes, hospital supplies, gloves, blankets, belting, footwear, hose and tubing, engineering and plumbing supplies.

Shipbuilding — Steamships, gunboats, subchasers, barges, lighters, scows, motor boats, launches, lifeboats, rafts, drydock plants and facilities.

Construction—Camps, warehouses, dock and terminal facilities, necessary additions and alterations to existing manufacturing plants, building of wholly new facilities such as powder plants, gas mask factories and loading plants.

Railroads—Railway artillery mounts, special cars for technical equipment, narrow gage and standard gage rolling stock.

Communications—Communication appliances, cable, facsimile, radio, telegraph, telephone, television, visual, direction finders, antenna, signal lamps and equipment, sound recorders and repeaters, sound and flash ranging equipment, teletypewriters, switchboards, telegraph sets, telephones, etc.

Petroleum—Lubricants, fuel, etc.

Puerto Rico

(*Continued from Page 77*)

At the conclusion of the war in 1918, Governor Winship was made Director-General of service in settlement of all claims in Europe arising out of our military activities and after that served with the War Reparations Commission. Later he became legal advisor to Henry L. Stimson and Dwight Davis, former governor-generals of the Philippines. Governor Winship was made, in 1930, judge advocate general of the U. S. Army with the rank of Major General, a distinction which places him among the Army's foremost officers. Shortly before coming to Puerto Rico, Governor Winship was appointed Special Commissioner to Liberia, Africa.

Of Governor Winship's army service, Maj. Gen. Frank R. McCoy, commanding general of the 2nd Corps Area, once said:

"Blanton Winship is so much of a gentleman, and so modest withal, that I do not believe his family and fellow citizens know of his distinguished gallantry in action and his outstanding service as a soldier in the field, both in the Philippine Islands as a young officer just transferred from the First Georgia Infantry to U. S. Volunteers, and during the great war in France . . . where he was not only cited for gallantry and leadership but was decorated by both of the commanders of the American and French armies."

Although Governor Winship still maintains a tremendous interest in military affairs and in the military groups stationed in Puerto Rico, he is today giving the major portion of his time to dealing with the basic economic problems of his people.

Latest and most constructive of Governor Winship's ideas for the betterment of Puerto Rico is his tourist plan, for the promotion of which he has organized the Institute of Tourism.

Almost since his first arrival in Puerto Rico, Governor Winship has preached the tourist possibilities in this tropical possession where a year-round temperature averaging 76 degrees and the advantages of seashore and mountain resorts within a few miles of each other, have placed the island in the category of "tourist musts."

His tourist program has shown amazing results after less than a year of action. More than 27,000 persons visited Puerto Rico during the last year, an increase of 195 per cent over the number visiting the island the year before. Hotels are springing up, a fishing fleet has been built and many other aids to the enjoyment of Puerto Rico's visitors are being pushed.

By far the most popular of Puerto Rico's recent governors, Winship has made great friends of the "Jibaros," Puerto Rico's simple-living hill folk, as well as the artistocrats of the island's Spanish group.

Often he is to be seen riding horseback with his aides through the picturesque mountains of the interior, to inspect a new sugar or tobacco plantation. He is a frequent guest at the colorful Spanish fiestas held in towns and plantations of the island.

But more often one will find the genial, keen-eyed general at his desk in the historic throne room at La Fortaleza, where 400 years ago, Puerto Rico's original conquerors fought off Indian attacks, patiently and thoroughly working out the problems which face his fellow-men.

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The U. S. Army Veterinary Corps

(*Continued from page* 131)

lieutenant of cavalry, the other pay of $75.00 per month and the allowances of a sergeant-major. In 1901, Congress abolished the grade of veterinarian of the second class, authorizing two veterinarians for each cavalry regiment and one for each regiment of field artillery, and gave them the pay and allowances of a second lieutenant mounted. This same Act also authorized the employment of veterinarians to attend quartermaster animals at a compensation not to exceed $100.00 per month. While this legislation was far from adequate, it did serve to bring into the Army a much better class of veterinarians but they were handicapped in their efforts for improvement and development of the service because of lack of rank and equal standing with commissioned branches.

Given Commissioned Rank

Finally in 1916, by the provisions of the National Defense Act, Army Veterinarians were accorded the rank of from second lieutenant to major, inclusive, and the Corps placed in the Medical Department where it properly belonged. Following the World War the National Defense Act, as amended, authorized a Corps of 175 officers in grades from second lieutenant to colonel. With the general reduction in 1922 of the number of officers in the Army, the number of Veterinary Officers was reduced to 126. In 1935, Congress eliminated the grade of second lieutenant in the Veterinary Corps and placed appointments and promotions on the same basis as that provided for the Medical and Dental Corps. As now constituted the Veterinary Corps consists of 126 officers in the grades of first lieutenants to colonels inclusive. This commissioned personnel is augmented by the allotment of 590 enlisted men of the Medical Department (Veterinary Service).

During the long struggle for adequate and proficient veterinary service in the Army, civil veterinary medicine in the United States was making excellent progress. It added richly to the contributions which European veterinary medicine had already made to the advancement of the medical sciences generally. A rapidly growing livestock industry of enormous financial value and of tremendous importance to the welfare of the country had been frequently threatened because of outbreaks of contagious diseases. This emphasized the importance of efficient veterinary service and led to the establishment, in 1884, of the Bureau of Animal Industry in the United States Department of Agriculture. This Bureau has always been headed by a veterinarian and its professional staff includes the largest number of veterinarians employed by any one organization in the world.

Educational Requirements Increase

As the demand for scientifically trained veterinarians grew, educational requirements were constantly increased. Private schools were gradually forced to close their doors so that today all colleges of veterinary medicine in the United States are integral units of state colleges or universities. Preliminary preparation in a college of Arts and Sciences is a prerequisite to matriculation in all veterinary colleges of the country. The poorly trained "horse doctor" of seventy-five years ago has been replaced by the skilled, college-educated and scientifically trained Doctor of Veterinary Medicine.

Following the passage of the 1916 Act providing rank for Army veterinarians, there was, unfortunately, considerable unavoidable delay in holding examinations, commissioning those selected for appointment, and organizing the Corps. Thus, when the United States entered the World War in 1917, there were but 62 veterinary officers in the Army and these had been but recently commissioned and insufficient time had been available for the proper organization of the Corps to meet war requirements. This operated to impair the efficiency of the Corps, especially overseas.

Reorganization of Army

The greatest advances by the Veterinary Corps followed the reorganization of the Army under the provisions of the National Defense Act as modified by the Act of June 4, 1920. Peacetime veterinary service has been placed on a highly efficient basis and provisions have been made for the operation of an effective system of evacuation, treatment, and hospitalization of sick and wounded animals in time of war. An unsurpassed system of inspection of meats, meat-food, and dairy products has been developed. This service is of great importance. In the first place it insures a safe food supply, thus protecting the health of troops, and secondly, the inspection for quality protects the financial interests of the Government. By comparing the value of products accepted with that of inferior items offered for delivery but rejected following veterinary inspection, it will be found that the savings effected by inspection amounts to a huge sum. During the year 1937 the Veterinary Corps inspected for the Regular Army, a total of approximately 145 million pounds of meats, meat-food products, dairy products, etc., at time of delivery. In this same year rejections amounted to 9 million pounds. A similar service is provided for the C. C. C.

Forage Inspection

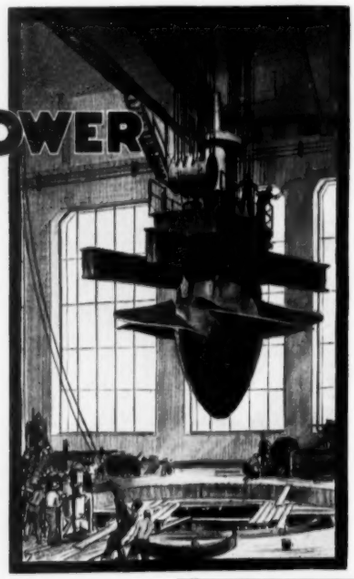
The Corps conducts a valuable forage inspection service, a large percentage of its officers being licensed as Federal hay inspectors by the Secretary of Agriculture. At quartermaster remount depots, a highly specialized veterinary service is provided in connection with animal breeding and other remount activites.

An excellent veterinary laboratory service provides bacteriological, pathological, serological, chemical, and other types of examinations necessary in conjunction with the diagnosis, treatment, and study of diseases of animals, and the inspection of food products. Veterinary research work is also conducted at these laboratories and, since 1925, one member of the Army Medical Research Board has been a veterinary officer. These research investigations have resulted in a number of important scientific accomplishments of great practical value not only to the Army but to civil populations as well. Several of these contributions have been accorded world-wide recognition.

Veterinary School

The Army Veterinary School at the Army Medical Center in Washington, D. C., provides courses of post-graduate instruction for veterinary officers and training for enlisted technicians. It also conducts the largest of the veterinary laboratories and manufactures certain biological products used by the Veterinary Corps. At the Medical Field Service School at Carlisle Barracks, veterinary officers, along with medical and dental officers, are given excellent training in field service duties.

The Army Veterinary Corps of today is a well-trained, efficient organization, rendering a needed and useful service, and is fully qualified to perform its mission under conditions of peace or war.



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DISCOVER *Puerto Rico* U.S.A.

The fortifications of El Morro at San Juan . . . magnificent example of ancient military art.

HISTORICALLY THE ARMY AND NAVY have played an important part in the development of Puerto Rico. For years members of both branches of the service were perhaps the most important links in reporting its tropical beauty, rare climate and scenery to the mainland U. S. A. Now, when thousands of travelers are being attracted by the picturesque charm of Puerto Rico, we extend a special invitation to the personnel of the services—active and retired—and their families to visit or live in the Puerto Rico of today. Splendid hotels, apartments and homes . . . every phase of modern resort and sport life is here. Yet, the centuries stand still in Puerto Rico . . . Old Spain welcomes you to its patios, gardens, fountains . . . to its old balconied streets. A contrast of the foreign and domestic found only in Puerto Rico. Now is the time to discover Puerto Rico, U. S. A.

El Morro is studded with sentry boxes through which its defenders saw Sir Francis Drake in 1595 . . . the Earl of Cumberland in 1598 . . . the Dutch in 1625 . . . Admiral Sampson in 1898.

The mountains of Puerto Rico temper the tropics . . . average summer temperature 76—winter 73. Rising 4000 feet into the sky between the Caribbean and Atlantic . . . cities, villages, rivers and plantations spread in terraced tapestry below.

Beautiful surf-swept beaches fringed with palms . . . mountain parks with forest pools . . . foliage the year 'round. The seasons stand still in Puerto Rico.

Although the island of Puerto Rico is comparatively small, it is an industrial country in its own right. Last year Puerto Rico bought from the mainland U.S.A. over 90 million dollars' worth of farm and factory products. Puerto Rico is the sixth best world customer of the mainland United States.

See your travel agent—or write to the Government of Puerto Rico, Institute of Tourism, 630 Fifth Ave., New York City.

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Army Nursing

(*Continued from page* 102)

work of the doctor in uniform as to the doctor in mufti, and Dr. McGee resigned. She lives today to know how well she builded forty years ago.

As the future welfare and successful work of the Army Nurse Corps to a degree is dependent upon the woman appointed superintendent, its progress and development will be outlined under each in turn.

The years March 15, 1901, to July 31, 1909, with Mrs. Dita H. Kinney, a member of the nurse corps with Spanish War service, as superintendent, were years of steady improvement and adjustment to army conditions.

August 1909, Miss Jane A. Delano was appointed superintendent, and under her guidance much was accomplished. The Act of February 2, 1901 had provided that the nurse corps consist of * * * "nurses and reserve nurses." The plan being that upon discharge after three or more years of service the nurse be designated "reserve nurse" and available for recall. This had not proved satisfactory. Miss Delano, who was also chairman of the American Red Cross Nursing Service, conceived and executed the plan that constituted the enrolled Red Cross nurses the reserves of the Army Nurse Corps. The corps now numbered 125. Pay increases, with additional pay for foreign service, and cumulative leave were authorized. The corps was growing up. On March 11, 1912, Miss Delano resigned to devote her entire time to the Red Cross Nursing Service, and while on an inspection trip of its nursing work overseas died in France, April 15, 1919.

Miss Delano was followed as superintendent by Miss Isabel McIsaac, who died September 21, 1914. During her tenure an increase in the Army Nurse Corps was authorized and by June 30, 1914, there were 150 nurses in the service.

She was succeeded by Miss Dora E. Thompson, who had entered the corps in April, 1902. She had seen duty in the Philippines, and had, as Chief Nurse, General Hospital of the Presidio, rendered conspicuous service during the San Francisco fire. That she was to have ample opportunity to again prove herself was yet to be. The Columbus, New Mexico Raid and subsequent Mexican border trouble, the occupation of Vera Cruz and the expansion of the corps to meet these emergencies were but forerunners of the tremendous task that faced her on April 6, 1917. From a nucleus of 403 the corps in eighteen months expanded to 21,480; of this number 17,956 were drawn from the reserves, the enrolled Red Cross nurses. Ten thousand went overseas with the American Expeditionary Forces, while the thousands remaining served throughout the United States and in overseas departments. With the signing of the armistice November 11, 1918, the work of demobilization was begun, and in 1919, Miss Thompson resigned as superintendent. On August 31, 1932, she was transferred to the Nurse Corps Retired List, having completed over 30 years of active service.

Miss Julia C. Stimson, who had entered the service May 15, 1917, had rendered distinguished service overseas. On December 30, 1919, she was appointed superintendent to succeed Miss Thompson. During her administration of the corps, pay increases were authorized and the status of the army nurse was more clearly defined. The National Defense Act of June 4, 1920, authorized relative rank from second lieutenant to major for the Army Nurse Corps, with all rights and privileges of commissioned officers, except pay and mileage. Retirement, with pay, after 30 years' service, or at 50 years of age and 20 years of service, became a law on May 13, 1926, and was followed by the Act of June 20, 1930, authorizing disability retirement on three-quarters pay for members of the corps. On May 31, 1937, Major Stimson, at her own request, was retired after 20 years of outstanding service. Today as President of the American Nurses' Association she continues her service to the world of nursing.

Entering the corps March 11, 1918, the writer after 19 years of service overseas and in this country, was appointed Superintendent, Army Nurse Corps June 1, 1937. An increase in the strength of the corps was authorized during the past year. It now numbers 675.

The army nurse today, like her prototype in civil life, is a highly trained professional woman. She needs must be to meet the standards required by the Army Nurse Corps. At least thirty-three percent are especially trained in the various techniques demanded in the administration of the modern general and special hospital. She has traveled far, this army nurse, since '63. Her advance has been steady. She will carry on.

Dentistry in the Army

(*Continued from page* 102)

to credit medicine with the recognition which it deserved. Dentistry encountered the same attitude. The Army was loath to give military rank to the dentists; medicine was reluctant to accord an equal status, for the scientific background and brilliant achievement were lacking. The accomplishments in this period were worthy of consideration. Conditions demanded some provision for a dental service.

The American Dental Association had long been interested in establishing an Army dental service and through all the years that followed it has assisted in every legislative program affecting the Dental Corps. On February 2, 1901, an Act was passed providing for thirty contract dental surgeons. This was the beginning of our present Dental Corps. This group was headed by Dr. John S. Marshall, a most distinguished and cultured dentist. He was an efficient organizer and his recommendations were received more favorably by the War Department than the suggestions of others. A bill was passed on March 3, 1911, increasing the number of dentists and giving them military rank. New appointees were on a contract basis for three years and after passing the required examination were commissioned first lieutenants. The National Defense Act of 1916 increased the Dental Corps and added the grades of captain and major for dental officers. Wartime legislation of October 6, 1917, increased the Dental Corps still more and provided for military rank equal with that provided for the Medical Corps.

The mobilization of dentistry during the World War and its outstanding contribution with medicine established a definite plan for it as an important health service. The maximum strength of the Dental Corps was 4,620 on November 30, 1918. Under the able leadership of Colonel W. H. G. Logan, in the Surgeon General's Office, and Colonel Robert T. Oliver, in France, a most complete dental service was available for all our troops and in all our hospitals.

The National Defense Act of 1920 brought many changes to the Medical Department. In the greatly improved organization, dentistry was given a distinct position which gave it the recognition as a health service in our Medical Department. Colonel Oliver became Chief of the Dental Division in the Surgeon General's Office. Under his able leadership the Dental Corps developed and expanded. Its great record during the War was an inspiration for great progress. The Army Dental School was established, research was instituted, projects for expansion and progress were developed.

The need for a larger Dental Corps was again considered in the last few years and on January 29, 1938, provision was made for an increase of over 60% for the Corps and for an assistant to The Surgeon General from the Dental Corps with the rank of brigadier general.

Seventy-five years ago dentistry as a profession was only 23 years old. Its recognition as a military necessity came only 37 years ago. During this period it has established itself as an important part of the Medical Department and its progress has been so closely identified with medicine that its place as a health service is unquestioned.

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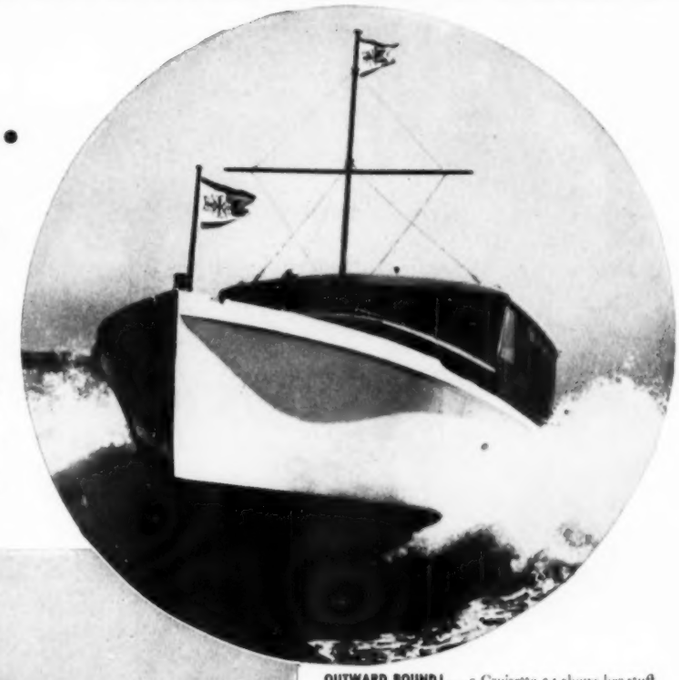

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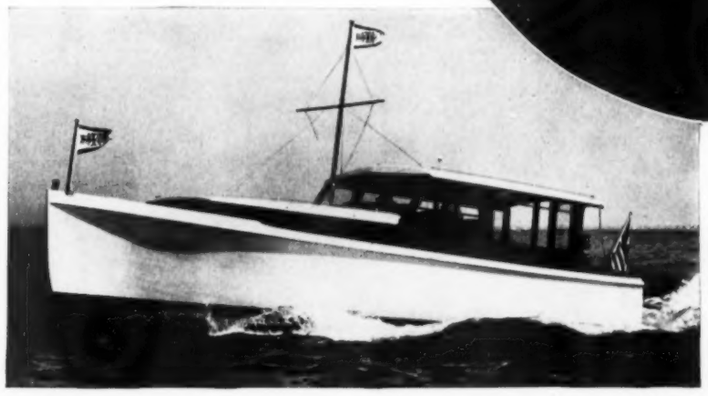

OUTWARD BOUND!...a Cruisette 34 shows her stuff in rough water! Elco cruisers bring you extra seaworthiness and safety because their hulls are of the round bottom type, universally recognized for superior sea-going ability.

THE HOME AFLOAT is an apt description for the Cruisette 34 (*left*), Elco's latest model. Here is cruising that is gay, with a fast, smart, rakish boat with sunshine lounging space fore and aft... that is comfortable, with plenty of room, wide spring berths, and features like Elco's "Vibrationless Power" and Sound-Proofing...that is practical, with two separate cabins, sleeping 6 to 8 in comfort, and a large, really efficient galley. From $6,675.

"SHE'S A BEAUTY!" Yachting experts praise the Marinette 30 (*right*), say that Elco has at last solved the problem of building a cruiser with style, quality construction, splendid seaworthiness, and spacious accommodations for extended cruising — yet one that is easy and economical to maintain and operate. This handsome 30-footer has a big full-headroom cabin forward (not just a cubby-hole!), sleeping 4 — and just imagine yourself in that 11'9" cockpit aft! Speeds up to 21 m.p.h. From $3,990.

Come aboard these sporty cruisers at Port Elco and see for yourself, or write for illustrated literature.

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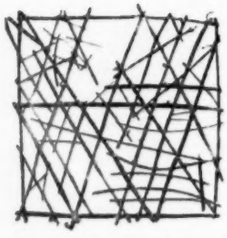
What men steer by



A type of native navigational chart used in the South Pacific as early as 1000 A.D.

FOR untold centuries, the natives of Polynesia voyaged far in their frail canoes over the treacherous South Sea waters.

They did not steer a haphazard course, but made careful charts of grass blades and sticks, showing winds, tides, and sailing routes. For a sextant they used a coconut, and they had considerable lore of the stars.

The wise man, like these primitive islanders, never steers a haphazard course. He charts his route on the sea of life, and sticks to it as closely as possible. He takes into account the winds and tides of adversity.

In short, he follows a carefully worked-out insurance plan. For that, he has found, is the only way to make certain of reaching the port of security. With the counsel of a trained and experienced insurance man, he makes intelligent use of life, accident, automobile, fire, burglary, and other forms of insurance.

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* * *

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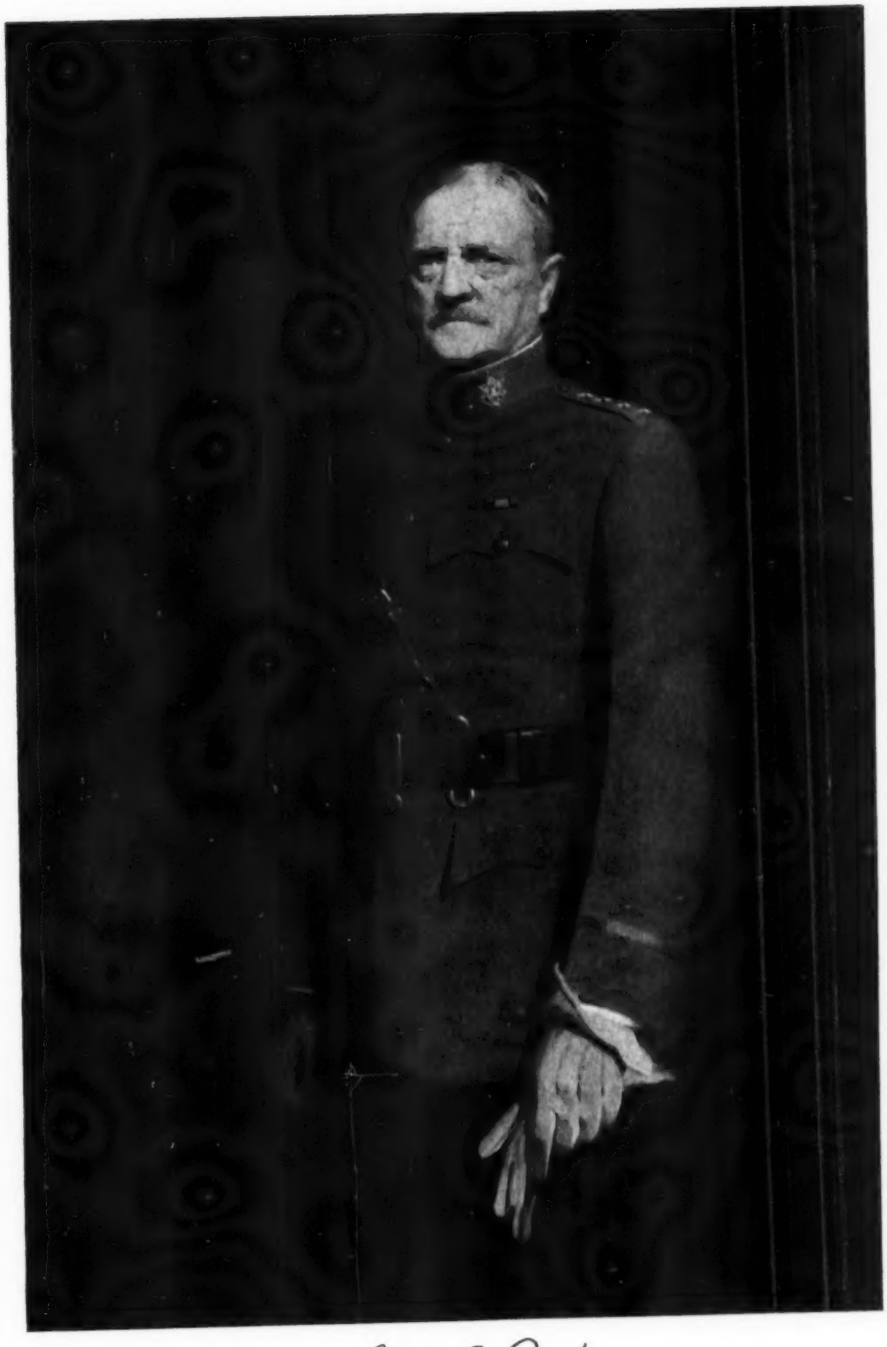

John J. Pershing

Above is a reproduction of the oil painting by the famous artist, Mr. E. Hodgson Smart, and is now in the New National Museum in Washington, D. C. The painting was made in Mr. Smart's Washington studio shortly after the close of the World War. The artist made a number of paintings of World War figures including one of Secretary of War Newton D. Baker, now hangs in the War Department, and one of Marshal Foch, in the Cleveland Museum of Art.

A NATION'S INDUSTRIES ARE ITS THIRD LINE OF DEFENSE

Armies without a constant stream of supplies are helpless in the field. Navies without material for repairs or munitions are tied to our shores. War today is a war of materials.

Modern wars are waged behind the lines, in the nation's factories. Modern war technique strives to destroy the source of munitions.

When the stream of war supplies is choked off, armies and navies are helpless. Legislation that prevents industrial expansion would affect our defense. Let us protect and encourage our industries to expand now, in time of peace, so that in a time of national emergency they will efficiently provide the sinews of war for our armed forces.

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